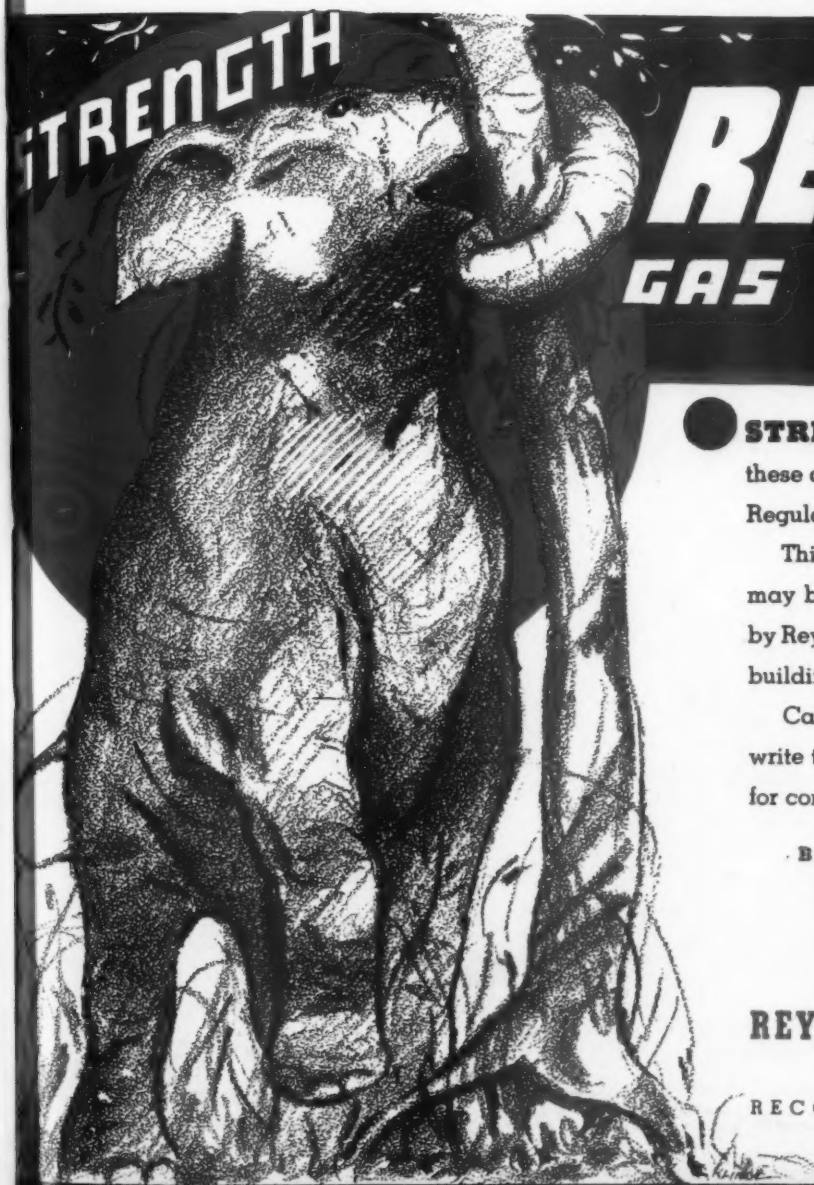
AMERICAN GAS JOURNAL

FEBRUARY, 1937



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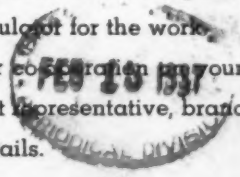

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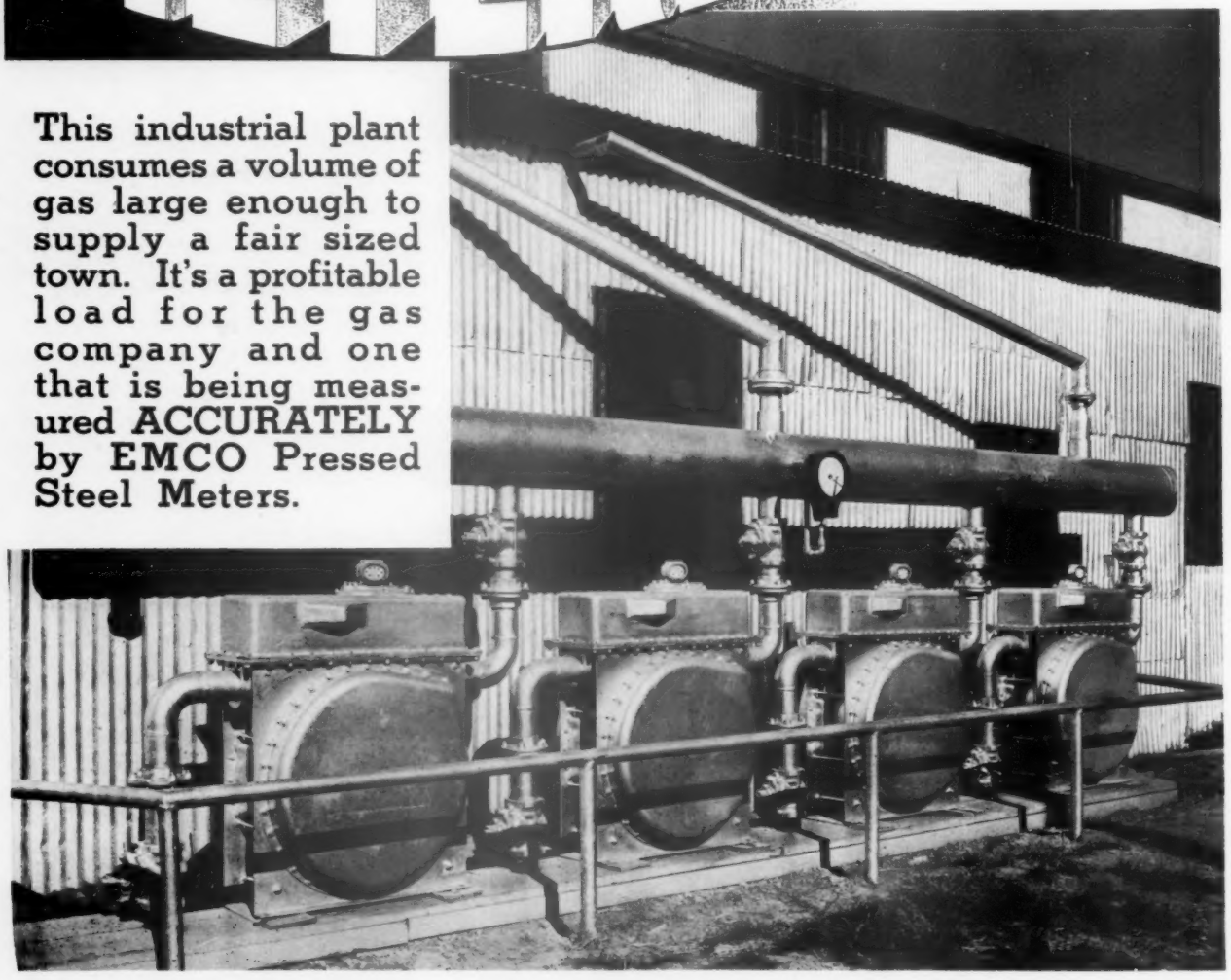

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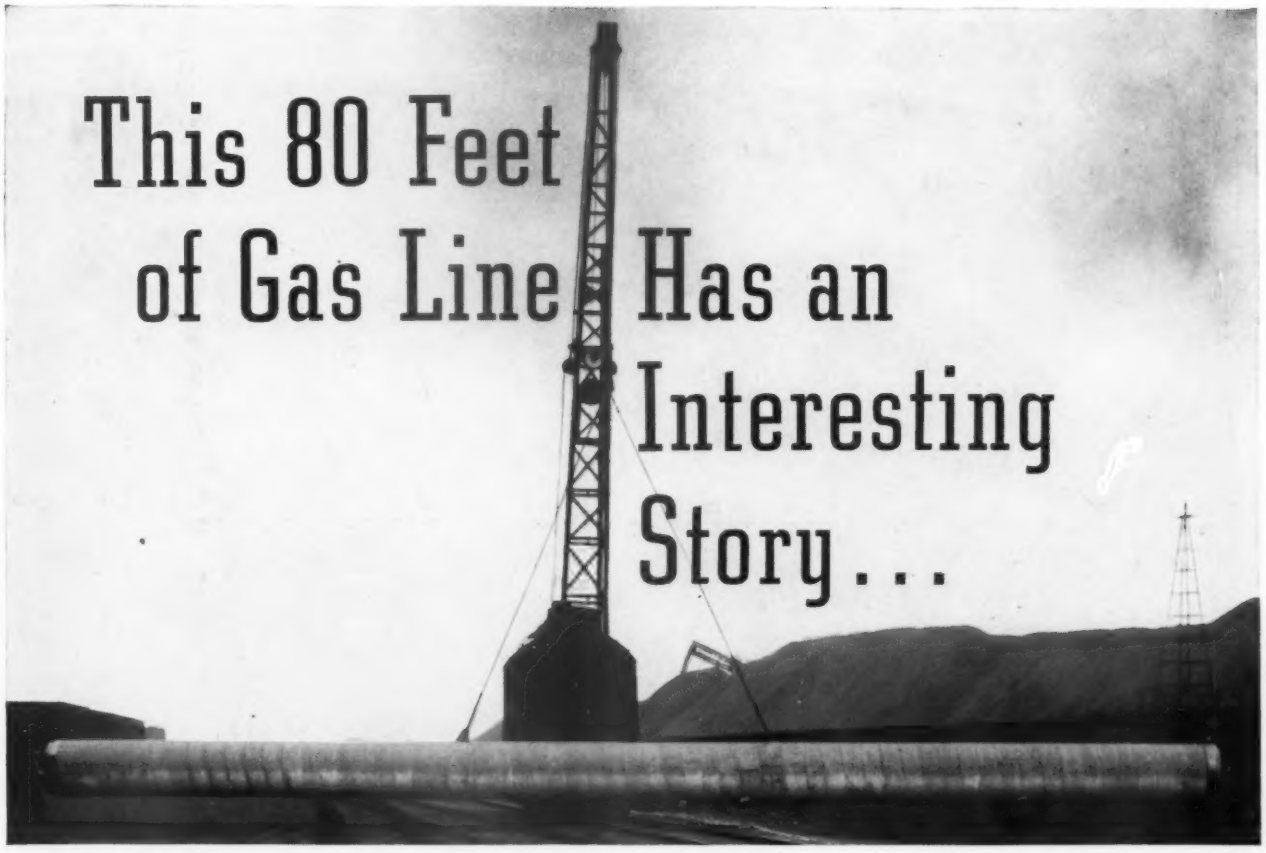

THE length of 48" pipe illustrated is part of a line to convey blast furnace gas to an electrical generating plant in Detroit.

The pipe was fabricated in our shops at Owosso, Michigan, mostly in 40-foot lengths and field welded to 80-foot units. A series of protective coatings, selected after careful study of soil conditions, protects the metal against a variety of corrosive forces.

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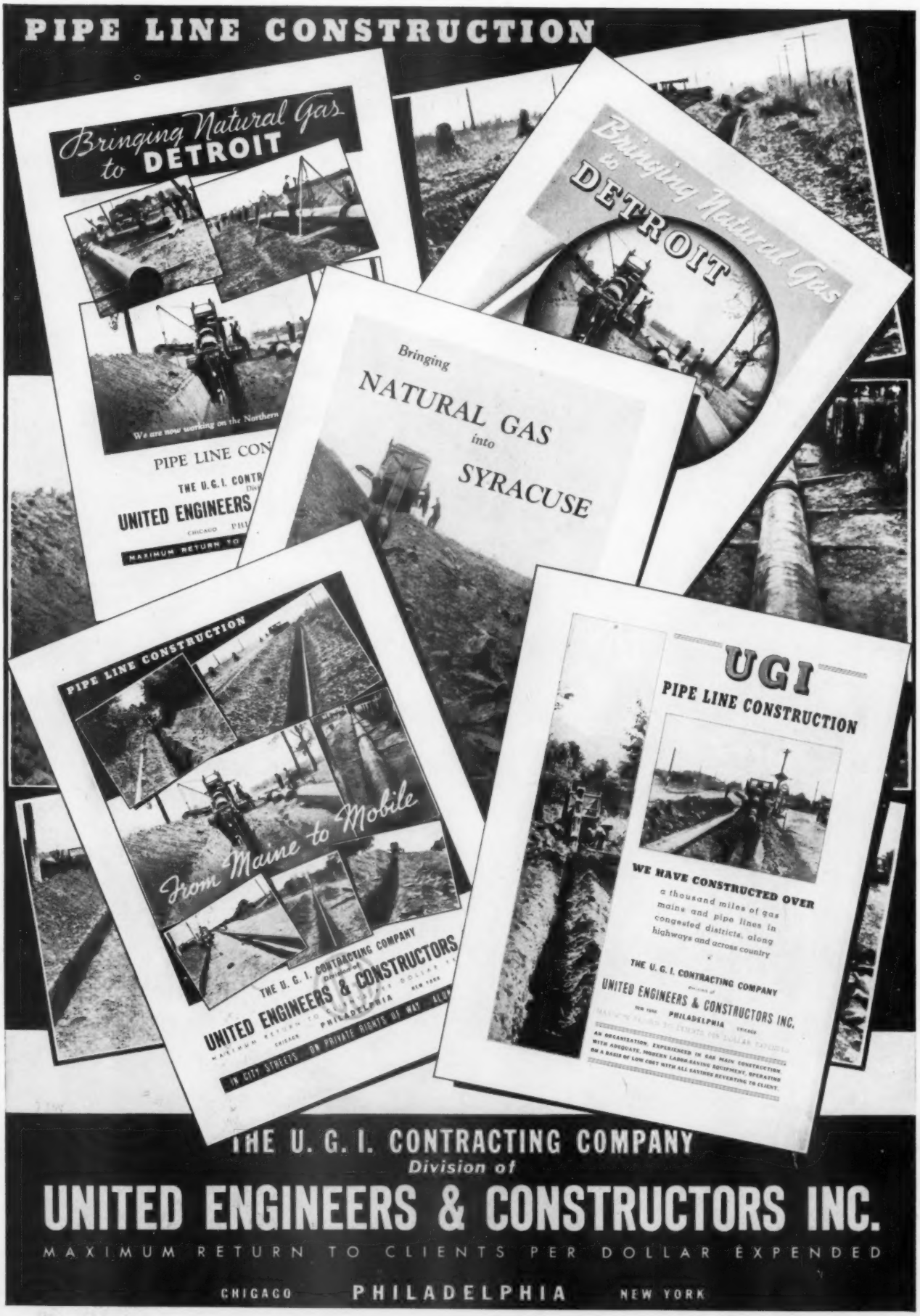
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It will be DIFFERENT . . . EXITING . . . BIGGER THAN VER.

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In 1937, Servel Electrolux will resent not one, but THREE CAMAIGNS!

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Servel Electrolux will talk to more prospects than ever before . . . will talk to each one in his OWN CHOSEN LANGUAGE.

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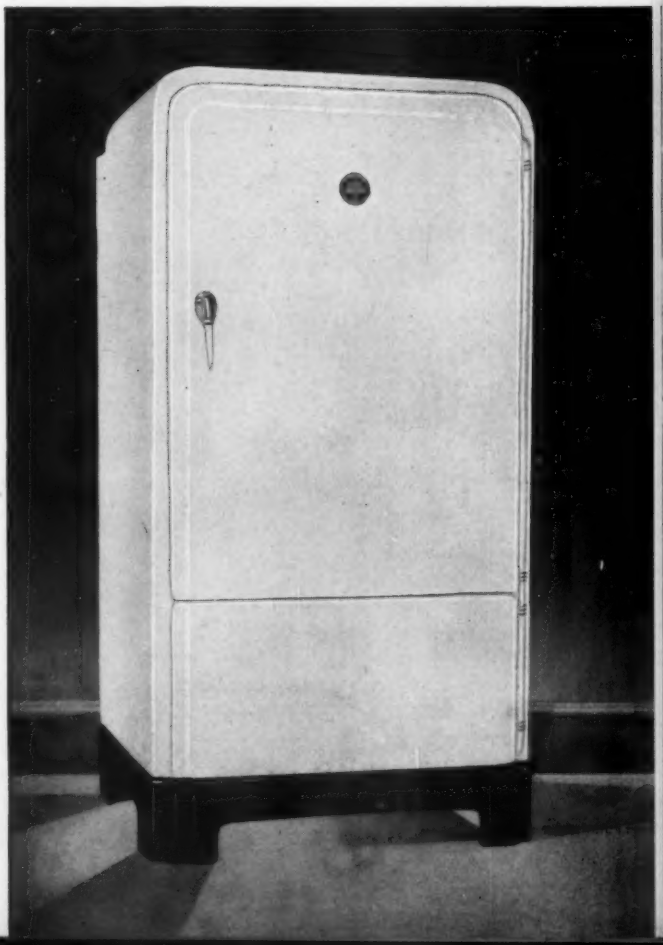
Servel, Inc., Servel Electrolux Sales Division, Evansville, Indiana.



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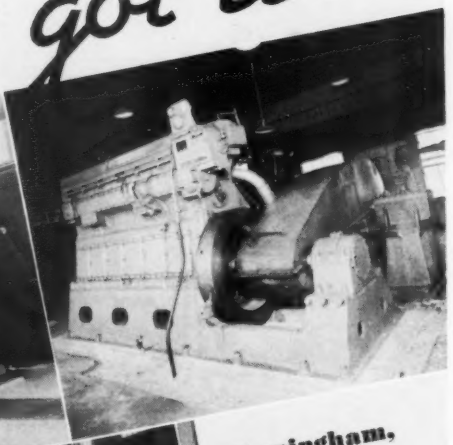
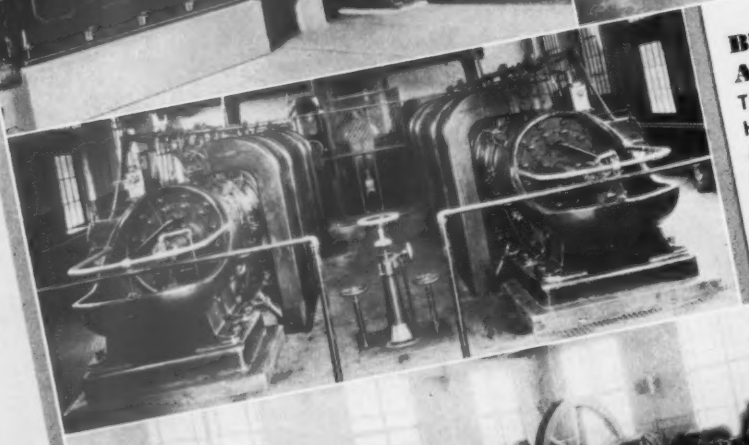
THE *Gas* REFRIGERATOR

5 Gas Companies Wanted CHEAPER POWER

Here's how they got it!



Gary, Ind. This 250 H. P. vertical gas engine economically drives a rotary blower, through a flexible coupling.



Birmingham, Ala. A pair of Type GN-6 (400 H. P.) vertical gas engines chain-drive the rotary gas boosters economically.

West Conshohocken, Pa. This 800 H.P. twin-tandem gas engine drives reciprocating compressors for boosting gas pressure in gas distributing system.

Chicago, Ill. This 500 H. P. horizontal gas engine economically drives a rotary blower through a flexible coupling.

Flushing, N. Y. A twin-tandem horizontal gas-engine driven compressor unit, similar to another installed in Westchester County.

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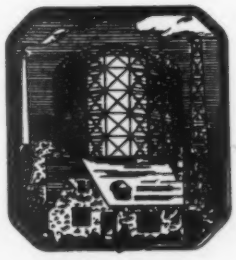

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Firm.....

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FEBRUARY
1937

AMERICAN
GAS JOURNAL

VOLUME 146
No. 2

The Outlook for Manufactured Gas

By
John E. Zimmermann

President, The United Gas Improvement Company,
Philadelphia, Pa.

IF IT IS to maintain and improve its important position in the national economy of the future, the manufactured gas industry must not only benefit from the lessons of the past, but, more than ever before, evince aggressiveness, resourcefulness, and vision. In my opinion, there never was a time in its long history when the spirit of the crusader, which has made this industry one of the greatest in the land, was more needed than now.

By this statement, I do not mean to infer that the gas industry is confronted by a crisis, but merely express my own conviction that never has our fuel been faced with greater competitive conditions, and that it will be only through the most intelligent, united action that it will be able to continue as an effective force in our national economic scheme.

The days of unchallenged growth in the gas business have gone forever, and from now on we must expect our every forward step to be vigorously opposed. Competition will be more pronounced than ever, and we must be prepared to meet it with a program dictated by hard reasoning. This will mean unstinted cooperative effort on the part of all of us, particularly in the realms of coordinated planning, publicity, and, above all, in research.

But gas can meet this challenge,

JOHN E. ZIMMERMANN

and will, as it has met and survived other and more serious challenges, for gas has always faced its crises with indomitable courage, and has ever shown a remarkable ability to adapt itself to change.

Better than any other major industry, gas has been able to meet and solve its problems; to survive periods of business depression; to adjust itself to necessity. Especially has this been the case in the last third of a century, a period of trial and change that provides us with many lessons to aid us in interpreting the future.

The Changing Field

A glorious page in the history of our industry is this period, a story of outstanding success and achievement in the face of almost insurmountable odds. Certainly no business ever underwent such a complete revolution in so short a time. At its opening, the chief function of our fuel was open-flame lighting. In the field of illumination gas then had no competitor, and although the electric light was beginning to offer it a measure of competition, so secure was its position in this field that there were few in the industry who were able to visualize the inevitable. However, the technology of electricity was making rapid advancement, and it soon became apparent that the death knell of gas as a lighting agency would be sounded and that other uses for the fuel must be developed.

For a time, the introduction of the incandescent mantle delayed the inroads of electricity, but the leaders of the gas industry realized that this reprieve would be only temporary. Therefore, they instituted a vigorous campaign to win the cooking load from cheap coal, at that time the universal direct heating fuel. As a result of this aggressive and sustained sales and educational campaign, supplemented by a comprehensive research program, gas not only became the dominant fuel in the fields of both domestic and commercial cooking,

but an important factor also in the spheres of both water and house heating. Thus, with the introduction of the Mazda lamp, and the almost total replacement of gas by electricity for lighting, the industry not only was able to absorb its lost load but actually to increase its aggregate output.

Anomalous as it may seem, it was in these years of uncertainty that gas registered the greatest gain in its entire history. It stands as a signal tribute to the inherent soundness of the gas industry that it was able to achieve this extraordinary record in such a trying period in spite of ever-increasing competition, restrictive legislation, rate reductions, increased taxation, and intermittent periods of business depression.

Growth Not Fortuitous

It is a significant feature of the gas industry that it has always advanced in spite of the many obstacles that have confronted it. Its growth has not been a fortuitous accident, but the result of continuous, logical development. From the day of its inception, it has gone forward because its leaders had faith in its destiny. And why should they not? Ours is one of the few major industries of the country that has never lacked stability. Indispensable to the economic scheme, it has rendered practically uninterrupted service to the public for more than a century. It has emerged unscathed from every period of depression; that is why its securities have always been regarded as safe and conservative investments. The structure of gas has been erected upon a foundation of sound economic philosophy and honest and progressive business principles, and it is the continuation of this same philosophy and these same principles that will assure beyond preadventure the perpetuation of gas.

It can be stated as a truism that the gas industry is in a very sound condition at present, and appears to be facing a future of great promise. It weathered the depression successfully, and in the past year has not only maintained but improved its competitive position.

Great Material Assets

Let us analyze briefly the present condition of our industry, and attempt to point out some of its future needs:

At the outset it can be stated that our industry is endowed with all the material elements essential to its success.

We have ample supplies of reasonably priced raw materials, and economical and favorable manufacturing processes for the efficient conversion of these cruder forms of energy into gas.

We have highly developed and economical methods of distribution.

We have modern, attractive, efficient, and moderately priced appliances.

We have 16,500,000 active meters, serving more than 70,000,000 people.

Yes, our material endowments are great, but they alone are not sufficient to guarantee the future welfare of our industry. The very impressiveness of these physical assets constitutes an element of hazard, for we may be tempted to be lulled into a condition of false security, believing that our industry is too large and too well established to feel very severely the effects of competition. This does not mean that confidence in our business is to be condemned, but it does mean that we must be ever alert to seek new avenues of gas application, to adopt new methods, to strive constantly to render better service to the public, to do our utmost to promote the general welfare of the industry.

Planning for the Future

There is a vital need, in my opinion, for the formulation of a sound, far-reaching policy for the future, which not only will provide for a solution of the many and complicated problems of the present, but anticipate so far as is humanly possible those that the future may evolve. Such a policy should be logically conceived and adequately balanced, with both the needs of the public and the welfare of those engaged in the production and distribution of gas and the manufacture of appliances impartially considered. This will demand the best thought and the most energetic action of all the industry, thinking and acting with a single impulse for the common good. The industry as a whole must have more intimate relationships.

Only by an intelligent program of organized planning can our industry meet the requirements of the future. I am not inferring that present methods are either slipshod or inefficient, but I do feel that a well-formulated plan of action is absolutely necessary at the present time.

Importance of Research

Especially is this true in the case of cooperative research. Technical development in the gas business has been very great, but, in my opinion, the industry as a whole has not paid sufficient attention to the possibilities of scientific exploration. The value of research is no longer hypothetical; it has become a vital factor in the prosperity of every branch of industrial activity. Speaking for our own company, I can state that we have always believed profoundly in the efficacy of research, and for more than half a century have maintained a research laboratory, which we feel, with all modesty, has contributed greatly to the upbuilding of the gas industry. It was in our laboratory, for example, that automatic sets, eliminating manual control, were introduced. The work performed by other gas and appliance company laboratories and by the great laboratories of our own Association, has also been outstanding. During the last few years, for instance, gas range burner efficiencies have been vastly improved, with resultant substantial savings to customers who have installed new modern equipment.

It is imperative, therefore, that future plans for the promotion of gas must embrace not only a much broader program of cooperative research, but that such a program be supplemented by independent effort on the part of manufacturer and distributor, for it is only through adequate and consistent research that gas will be able to withstand successfully tomorrow's competition.

Necessity for Aggression

Gas utility management must use the proper perspective in assigning importance of departmental activities. Today's conditions demand that great emphasis be placed on an aggressive promotional and new business program. It must be realized that the industry's success lies only in growth, and that the continuance of that growth is a responsibility that must be shared by every employee.

It is the exclusive province of management to see that each department accepts the challenge of load building. Unless every employee feels a sense of personal responsibility in

extending his company's business any plan of action will fall short of success.

Where the promotional type of gas rates are not in effect, the rate structure should be modified to provide the proper opportunity for load retaining and load building activities.

An intelligent program of education should also be worked out, especially as it concerns the men who are to sell the fuel, appliances, or equipment. The modern gas salesman should be an ambassador of business, not only understanding the principles and psychology of salesmanship, but having a thorough knowledge of the fundamentals of the industry, and at least sufficient technical knowledge to break down sales resistance.

Aggressive national and local advertising must play an increasingly greater part in our future development. I cannot emphasize too strongly the importance of advertising and publicity to the prosperity of our industry. In my opinion, too, there is need for wider and franker corporate publicity.

In studying the market, it is wise to remember that the class of people who must be convinced—the class most valuable to the future of the gas industry—is the younger generation of women; the housewives and the girls of high school and college age. To be successful our advertising and other promotional efforts must appeal particularly to this group.

Now a few words as to the immediate outlook of the industry:

As has been stated, our fuel must expect even greater competition from other fuels than in the immediate past, particularly in the commercial and industrial fields, and, to a lesser extent, in the realm of domestic cooking and heating.

Underlying Cause of Decreased Demand

In my opinion, there has been a tendency to exaggerate the competition that gas has had from electricity. The fact of the matter is, increased competition was hardly a factor in the decreased consumption of gas during the depression period, but was the result almost entirely of lowered purchasing power, compelling consumers to employ a single fuel and to economize generally.

Rapidly Expanding Applications

A certain but significant transition is now taking place in the industry that would seem to presage a greatly increased application of gas, especially in house and water heating, and in industrial applications. In the fields of cooking, house heating, and water heating, the position of gas would appear to be secure, except in particular areas of the country where coal is high in price and difficult to obtain, and electricity is plentiful and relatively cheap.

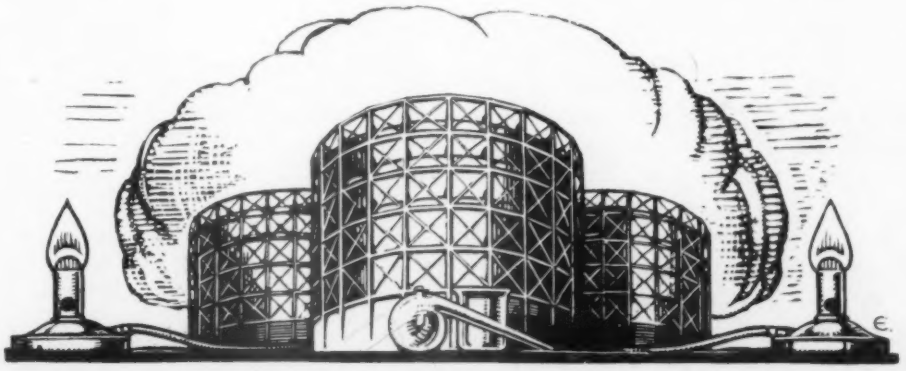
No fuel can compare with gas, in comfort and convenience, for house heating, though recently our fuel has had to meet severe competition from other liquid fuels which have been inordinately low in price. How successfully manufactured gas has met this competition is eloquently illustrated by our own city of Philadelphia, which, in the very heart of the petroleum center of the East, with its great refineries and its thousands of pipeline-fed storage tanks, has now 4,500 distinct gas house heating installations, with a rate of acceleration rapidly increasing. As general business improves, it is logical to expect that there will be a gradual rise in the commodity index, making it increasingly difficult for liquid fuels to compete successfully with either gas or coal in this field.

Gas Price Control Protects Consumer

A strong argument in favor of gas is that there are no public service commissions to regulate oil prices, whereas gas rates are absolutely controlled by public regulatory bodies. The gas consumer knows in advance just what he must pay for every thousand cubic feet he consumes. Not so the user of oil, who, as a rule, is never able to obtain long-term contracts against the future. He never knows when the price of his fuel may be increased. Oil has always been a commodity of fluctuating price, governed only by the law of supply and demand. During the war, for example, the price of oil increased more than 600 per cent.

The field of new building construction is one where a forceful policy must be adopted to insure a full use of gas appliances. Here competition will be most severe and it will be necessary to surpass the methods of competitors in order to obtain the business. The importance of obtaining gas cooking and water heating, particularly in new home construction, cannot be over-emphasized. Such prominent examples of customer fuel acceptance represent the most effective form of advertising.

In conclusion, let me state that the manufactured gas industry has all the material endowments necessary for its future. It needs only confidence, and a continuation of that crusading spirit of aggressiveness that has won for it, in spite of almost insurmountable odds, its present important position in the national life.



The Flood

How Gas Service Was Affected

On January 29th the AMERICAN GAS JOURNAL sent the following telegram to various gas companies in the flood area:

"GAS INDUSTRY GREATLY INTERESTED AS TO HOW SERVICES WERE MAINTAINED IN FLOOD AREA WILL YOU WIRE US HOW FLOOD HAS AFFECTED GAS SERVICE IN YOUR DISTRICT"
AMERICAN GAS JOURNAL

The Replies:

"AT WHEELING AND VICINITY APPROXIMATELY FIFTEEN THOUSAND METERS UNDER WATER . . . GAS SERVICE MAINTAINED THROUGHOUT FLOOD EXCEPT ESTIMATED FIVE HUNDRED TO EIGHT HUNDRED CUSTOMERS . . . RIVER STARTED RECEDING WEDNESDAY . . . GAS SERVICE RESTORED TO ALL CUSTOMERS BY SATURDAY NOON THIS WEEK . . . COVINGTON AND CINCINNATI NOT IN OUR GROUP CONTACT CINCINNATI FOR THIS"
COLUMBIA GAS AND ELECTRIC CORP.
PITTSBURGH GROUP

From Louisville:—

"GAS SERVICE IN LOUISVILLE HAS BEEN MAINTAINED THROUGHOUT THE FLOOD ALTHOUGH BOTH SUPPLEMENTARY GAS MFG PLANTS ARE UNDER SEVERAL FEET OF WATER THERE IS A SUPPLY OF NATURAL GAS AMPLE FOR ALL NEEDS . . . WATER SEVERAL FEET OVER METERS HAS MADE IT NECESSARY TO SHUT OFF SOME INDIVIDUAL SERVICES BUT PRACTICALLY EVERY CONSUMER ABLE TO USE GAS HAD AMPLE AND CONTINUOUS SERVICE . . . FLOODED MAINS SERVICES AND OTHER USUAL AFTERMATH OF HIGH WATER ARE SHOWING UP BUT CAN BE TAKEN CARE OF BEFORE THE HOUSES IN AREAS AFFECTED ARE HABITABLE AGAIN"
T B WILSON PRES LOU GAS AND ELECTRIC CO

From Cincinnati:—

"REPLYING YOUR TELEGRAM NORMAL GAS SERVICE HAS BEEN MAINTAINED THROUGHOUT ONR ENTIRE TERRITORY IN OHIO AND KENTUCKY WITH THE EXCEPTION OF FEW SMALL DISTRICTS WHERE GAS MAINS HAVE BEEN INUNDATED BY FLOOD WATERS . . . WE HAVE HAD AMPLE SUPPLY OF GAS DURING PERIOD OF FLOOD"
H C BLACKWELL

From Memphis:—

"REPLYING TO YOUR TELEGRAM OF TODAY . . . FLOOD HAS NOT AFFECTED NATURAL GAS SERVICE TO THE CUSTOMERS OF THIS COMPANY"
MEMPHIS POWER & LIGHT CO

In Paducah, Ky., practically every residence in this city of 30,000 people was entered by flood waters. With some 8,000 homes inundated the following brief report by wire tells the story. It will probably be thirty days before the city again becomes habitable.

"PADUCAH GAS PLANT AND EIGHTY PER CENT OF MAINS SUBMERGED . . . NO SERVICE SINCE JANUARY TWENTY-FIRST"
KENTUCKY UTILITIES CO

The following information was received by telephone and by personal interview:

Portsmouth, Ohio—

"It was necessary to discontinue gas service in approximately one-half of the city which was under about 40 feet of water. However, every house which was not submerged had gas continuously and even where the first floor was under water and persons continued to live on the second floor, they were supplied with gas. Service was restored as fast as the waters receded."

In Evansville, Ind., the Southern Gas and Electric Co. as a matter of precaution cut off gas service in the deeply flooded areas but maintained continuous service in the unaffected districts. In one district all the controls were flooded and as the situation became unmanageable, service was temporarily discontinued at the request of the military authorities. Since the city departments were unable to cope with the fire hazard this was deemed advisable.

The stand-by water gas plant was undamaged ready for service in emergency but was not needed. So far as known, all distribution lines remain intact and are ready to go back in service as soon as the flood subsides.

Editorial Comments

When All Else Fails

IN THE January issue of the *Journal* we alluded to gas as "a service which is perhaps the most reliable and unfailing that is produced by man." Little did we dream how soon that statement would be tested nor how severe that test would be. We invite our readers to look at the flood record just as it came to us by telegraph and telephone. With transportation and electric service paralyzed and water service available for only a few hours a day, the gas was on nearly everywhere where homes were habitable.

In the flooded districts people were told to boil their drinking water. They had to eat, and warmth was essential to prevent the spread of disease. No one will ever know how many lives were saved by the devotion to duty of the gas company employees who tackled a seemingly impossible task and won. The news reports carry nothing about it. That gas service will not fail is taken for granted.

We suspect that in every town along the Ohio River and its tributaries the report quoted by Ex-President Denning at the Convention last year would be applicable: "Boss, we had a hell of a time, and nobody knowed about it but us."

1939 New York World Fair

TWO years hence at New York will be held one of the greatest industrial exhibitions of all time. People from all over the world will visit it, not only for their amusement and general education but also to learn what developments have been made which they can apply to advantage in the particular line of business in which they are engaged. Salesmen have told them of particular types of equipment which should save them money. They have seen pictures of these and read reports of their operation. Here should be an opportunity actually to see them **working.** Members of the gas industry, what are you going to do?

We ask this question in no spirit of criticism either expressed or implied. However, we have received several letters from New York World's Fair 1939, Incorporated, asking our cooperation in telling the gas industry of this coming event, and in suggesting that it take advantage of the opportunity which it offers. Then it was we found that information about it was generally very meagre. We believe many other industries have done much more to date than we have. It is time that all of us, and in particular our manufacturers, secured full information about the Fair and considered well how they can take advantage of it.

Our Associations have a committee to coordinate the work of the gas industry and to formulate plans to publicize gas service at this 1939 event. An announcement from these committees is to be expected in the near future. However there are two distinct questions: (1) What should the industry do cooperatively for the general advancement of gas service, and (2) what should the individual manufacturers do for the promotion of their particular businesses? It is to be expected that the Association will concentrate their attention on the first question, but the second is hardly less important. **The impression created by the gas industry will come from the extent and quality of all of the exhibits of its members.**

One word more. Do not look on the Fair as merely an opportunity to cater to the passing interest of a pleasure seeking crowd. To be sure the exhibits should be dynamic, should have action as well as being instructive and should avoid anything requiring concentration and attention. But an exhibition such as the one to come is a real and potent force in the industrial development of the nation and in moulding the thoughts and anticipations of the mass of the people. The Centennial Exposition in Philadelphia sixty years ago marked the birth of a new industrial era. The World's Fair in Chicago, and in fact every subsequent similar event right down to the one in Dallas last year, has had a profound influence. In Dallas, Henry Ford is said to have spent $2,500,000, or about 70 cents per contact; and we are told he considered it money well spent.

1939 holds out an opportunity to us. No penny pincher can make much use of it; but it is nevertheless a real opportunity.

The Building Boom

WE HAVE said it before, and we now say it again: We are in the midst of a building boom, and a golden opportunity to extend gas service is thrown open to us.

Mr. William C. Bober, head of the Statistical Research Department of Johns-Manville Corporation, writing in the January issue of the "American Builder" predicts that 425,000 homes will be built in 1937. This will be an increase of between 60 and 65 per cent over the 260,000 which he estimates were built during 1936.

In order to take advantage of this situation we must have certain things in addition to reliable and economical service and efficient and good looking appliances. We must have (1) an adequate and aggressive sales force well supported by executive management, (2) good public relations, (3) an attractive rate structure and (4) local as well as national publicity.

Check these over. Do you have all of them? If so, the building boom is an opportunity to be welcomed. If not, then it will be well to develop them lest this same building boom turn out to be a headache for you.

The New Spirit in the Gas Industry

By F. L. Ball

Regional Executive of The New England Power Assn.,
President of The New England Gas Association

IN THE last year, the gas industry has been viewed in a new light by the people engaged in it and by the public as well. Several constructive developments within the industry have produced this change. The gas men have realized more clearly the natural economic advantages of their product and they are using the most modern methods of promotion with the result that its morale has vastly improved and its psychology is offensive instead of defensive. This change in viewpoint and methods has impressed the public favorably. Hand in hand with these developments has gone a year of important research which has made possible substantial improvements in equipment, both from the standpoint of beauty of line and color and of operating efficiency.

Starting with the September issue, the first national advertising campaign ever staged by the gas industry has been running in 24 leading magazines. Four-color pages are being used in six of them. This national cooperative advertising program is on a three-year basis and more than seven hundred companies serving in excess of 70% of the country's gas meters have underwritten the campaign. It is conservatively estimated that this campaign will reach fifteen and a half million families. The keynote is "Modernize Your Home With Gas" and emphasis is placed upon the latest gas equipment and its uses.

The "Mystery Chef" radio program is now in its second year and covers five million meters in the East and one million on the Pacific Coast. More than one million recipe books have been distributed at the request of persons who have heard this interesting and constructive program. An additional 500,000 booklets are now being printed. This is the first radio program on such an extensive basis which the gas industry has ever had.*

Paper presented before the First Annual Merchandising Meeting of The New England Power Association, December 30, 1936.

** Some details of this program appear in American Gas Journal, December, 1936, pg. 42.—Ed.*

Bachrach Photo

F. L. BALL

The gas industry is a substantial factor here in New England as the following figures indicate for the year 1935. There were over one million gas meters in operation; gas sales were over forty-one billion cubic feet; revenues from gas sales were over 47 million dollars; there were 9500 employees and there were over thirteen thousand miles of main.

Gas Energy Ranks First

A statement by President Denning of the American Gas Association in his address at the recent annual meeting presents strikingly the extent of the gas industry's service to the American public. I quote from his speech: "I quote to you some figures given by a representative of the Federal Trade Commission, who appeared before a Congressional Committee considering national regulation of natural gas pipe lines. To me these figures were astounding. We are accustomed to hearing much these days about the electric industry. We may yield to it in some respects, and recognize its importance in the social fabric of our lives, but how many know that measured in terms of efficiency, in delivered energy during the year of 1934, natural gas alone delivered to America two and one-fifth times the total amount of electric energy produced by all the electric plants in the United States. Not included in those figures is the potential energy of the Manufactured Gas Industry."

Thus far, I have not presented any figures in regard to the progress during 1936. I think you will find those which I am about to present both interesting and encouraging.

Gains During 1936

The total number of customers was sixteen and a half million—the largest number in the industry's history, exceeding the previous peak of 1930 by over a half a million customers. Of this total, manufactured gas customers numbered over ten million and natural gas customers numbered over six million. The total revenues were more than 700 million dollars which represented a gain of 6.4% over 1935. The manufactured gas revenues were more than 376 million dollars which showed a gain of 1.4% while the natural gas revenues were more than 396 million dollars which showed a gain of 11.6%.

The manufactured gas domestic sales declined 1.9% and it is felt that much of this decline is due to efficiency improvements which have been very substantial in domestic appliances in recent months. The manufactured gas househeating sales increased 16.7%. Manufactured gas, commercial and industrial sales showed a substantial increase of 22%. I will not present the natural gas figures for these several items as we are not so directly interested in them, although I can add that these increases were extremely large.

Gas range sales approximated 1,500,000 which was 30% ahead of 1935. Water heater sales were 30% ahead of 1935, the automatic types were ahead 55%, conversion burner sales 84% ahead, househeating boiler sales 88% ahead,

furnace sales 130% ahead, and refrigerator sales about 50% ahead of 1935. It is worthy of note that these various sales figures represent new high levels for the industry.

House Heating Sets High Mark

The great increase in the sale of gas for househeating is indicated by the fact that the 1936 volume was approximately three times the 1929 volume. The manufactured gas companies have not only recovered the industrial and commercial load lost during the depression years but the 1936 figure is more than 12% ahead of the record previously established in 1929. Many new outlets are presenting themselves in these two fields and new processes and equipment have been developed recently which are very encouraging for this part of the industry's business which represents about one-third of its total volume. Considerable progress has been made in the air-conditioning field in the last few months and there are indications that the gas industry is prepared to benefit substantially from this new development which has required the introduction of new apparatus and the extensive research connected with this equipment development.

Rates a Factor

Individual gas companies throughout the country have introduced various promotional rates and have launched more carefully planned and far-reaching sales promotion campaigns than ever before. There has been some very frank discussion among the gas industry's leaders during the past several years regarding effective methods of developing the industry under modern competitive conditions and these discussions are bearing fruit. The advertising and the radio programs, which are supervised by the A.G.A., have developed from this frank facing of the situation which the industry has been doing.

A recent development which has a favorable significance for the gas industry is that several prominent electrical appliance manufacturers have entered the gas business. General Electric, Kelvinator, Norge, Gar Wood and others are now making gas ranges, househeating and air conditioning appliances. It is reliably understood that several other large appliance manufacturers previously identified wholly with the electric and oil industries are contemplating entering the gas appliance field in the near future.

It is further significant that no well-established gas appliance manufacturers have entered the electrical field nor is there any indication of such a trend. We all respect the merchandising ability of the several electrical manufacturers mentioned and their entrance into the gas industry, bringing with them thousands of distributors and retail dealers, constitutes a rather forceful indication of the possibilities of the gas industry. These manufacturers have satisfied themselves as to the economic soundness and the public acceptance of gas, its service and its appliances.

New and Improved Appliances

There has been a substantial improvement in the efficiency and the beauty of various gas appliances during the past year and the recent exhibit at Atlantic City presented many of these improvements, and introduced some wholly new equipment. It is generally felt that the manufacturers have made greater progress in appliance improvements during the past year than in any one year in the industry's history. The gas industry may well be proud of the 1937 models of its various appliances and there are already indications that the public appreciates the engineering and artistic advances that have been made. In connection with the introduction of these new appliances, the A.G.A. laboratory has tested and approved slightly over 50% more basic models than during the year before. The actual figure this past year was 1,491 and it was divided as follows: gas ranges, 24%; water heaters, 17%, space heaters, 23%, central heating appliances, 17%, accessories and other miscellaneous types of appliances, about 20%. In recent years, the A.G.A. laboratory has effectively supplemented the research of the manufacturers. I understand that even more efficient gas cooking equipment will shortly become available.

It is interesting to note that the Public Works Administration has recently purchased 10,566 gas ranges of a new design for use in 26 P. W. A. housing projects located in various parts of the country. This same agency has recently purchased 2,128 gas refrigerators for use in 7 housing projects, one of which is in Cambridge. The local project is buying 270 gas ranges and 270 gas refrigerators. Other similar purchases will undoubtedly be announced from time to time as these various projects take more definite shape.

I think it can truly be said that the gas industry today is more alert, harder at work, engaged in more valuable research, conducting stronger sales promotion campaigns, and facing the future more aggressively and better equipped to give a good account of itself than ever before in its history.

In some ways the depression years were probably valuable years for the industry, because facts were faced, lessons were learned, new conditions were grasped, fundamentals were appreciated as never before, the deck was cleared for action, and a new attitude and spirit came into the picture. Necessity is truly the mother of invention and we learn far more from our mistakes than we do from our successes. Perhaps the depression was a blessing in disguise for the gas industry. Certainly, it bears little resemblance now, in many essential respects, to the gas industry of 1929.

The material which I have presented indicates that the industry has a sound and permanent foundation and that its leaders have already placed it in a position where it can and will give a good account of itself in the years to come. Truly, the gas industry is alert, progressive and modern and the facts indicate that a substantial portion of the public share that viewpoint.

In closing, I would like to commend the excellent work which the American Gas Association is doing nationally and which the various regional gas associations are doing in their respective areas. It has often been said that the electric industry is fortunate in having several very large manufacturers whose organizations have done a tremendous sales promotion job for the electric utilities. The very fact that similar large manufacturers are lacking in connection with the gas industry has meant that our various gas associations have had the task of providing sales promotion cooperation for their company members.

Associations Stimulate Progress

Because of the added fact that the gas industry has faced an increasingly competitive situation, the work of these various associations

(Continued on page 68)

Gas immersion heaters in an automobile garage cleaning tank. The gas burners are entirely enclosed so no flame or spark can come in contact with gasoline vapors.

Gas Immersion Heating

Hot Solution Tanks, Cleaning Tanks, etc. Heated by a New, Ingenious, Simple and Economical Method

By J. B. Nealey

American Gas Association

HOT solution tanks are universally employed throughout industry. Especially is this true in product cleaning for few products will take a finish unless the dirt, grease and foreign matter acquired in manufacture are first removed. Practically every metal product factory, such as the automobile plant, is equipped with one or more hot solution cleaning tanks and many have dozens. While most of these are used for dipping, many are part of automatic cleaning and drying machines equipped with traveling conveyors. These machines are so designed as to speeds and capacities that they become machine tools and are synchronized with the other machines in the production line. In any case the speed and flexibility of heating are most important. Pickling tanks and plating tanks come next in order of use.

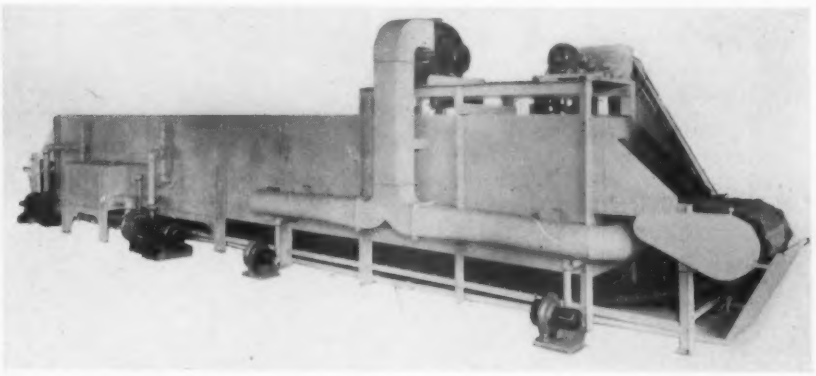
Gas immersion is the modern, economical way of heating hot solution tanks. It is new, ingenious, simple and efficient. Formerly steam or underfiring with gas was employed, while a few even used expensive energy. Gas immersion heating for the tanks is cheaper and faster to operate and more economical to install. It is a decided improvement over gas underfiring, the next best. and formerly the most popular method. In the first place, sediment deposition materially reduced heat transfer and subsequent overheating will cause the tank bottom to break down rapidly. The immersion tubes or coils are spaced above the bottom so as not to be affected by this factor. Secondly, the bottom can be insulated, as well as the sides, which cuts heat losses and fuel consumption and makes the operation much more comfortable for the operator.

Cheaper, Faster, More Economical

As compared with steam heat from a central power plant or heating system, higher overall efficiencies are obtained with gas immersion. Investment cost is much smaller than the installation of steam pipes, condensate returns, collecting tanks, steam traps, pressure controls, etc. Flexibility is obtained with a battery of gas immersion units as the number in use can be quickly increased or decreased to meet fluctuating production schedules. Wooden tanks can be heated with gas immersion coils but not by underfiring. Common iron and steel pipes are satisfactory with ordinary cleaning solutions. Lead coils are used with acid tanks (pickling, electroplating, etc.)

Immersion coils are made up of lengths of standard pipe with standard fittings. They are laid horizontally and close to the bottom of the tank with one end welded to a hole in one side of the tank. A gas burner is clamped to the outside of the tank in such a position as to fire through this hole and into the coil. To the other end of the coil is attached an upright piece of pipe to act as flue. Either atmospheric or pressure gas burners can be used. Any existing installation can be quickly and easily converted to this method of heating. A new unit can be made up and assembled with an atmospheric type gas burner by a local welder from

relatively simple plans when this is necessary. However, stock sizes of liquid heating tanks equipped with immersion gas heating tubes are available from a number of manufacturers. When cutting holes in the tank is inadvisable, a U tube can be used with the burner firing down one leg.



Automatic and continuous unit combining washing, rinsing, and drying. Immersion gas burners heat the solutions in the tanks and premix gas burners furnish heat for the drying oven. Note the moving conveyor and the ducts and fan for recirculating the heat in the drying oven. Also, the motor driven pumps for forcing the hot cleaning compound and hot rinse water through the spray nozzles.

Several designs are shown all of which have proven successful in actual service. The tanks, for the most part, are 3 x 3 x 3 ft. Pipe sizes range well within 3 to 5 in. in diameter. Flue heights vary from 4 to 7 ft. The longer flues provide greater draft and the burning of larger volumes of gas which results in faster heating. There is considerable latitude as to design and heat input, all resulting in equal efficiencies. While increasing the heating up speed is at the sacrifice of efficiency when operating at holding heat, this efficiency can be restored by turning down the burner.

Insulation Desirable

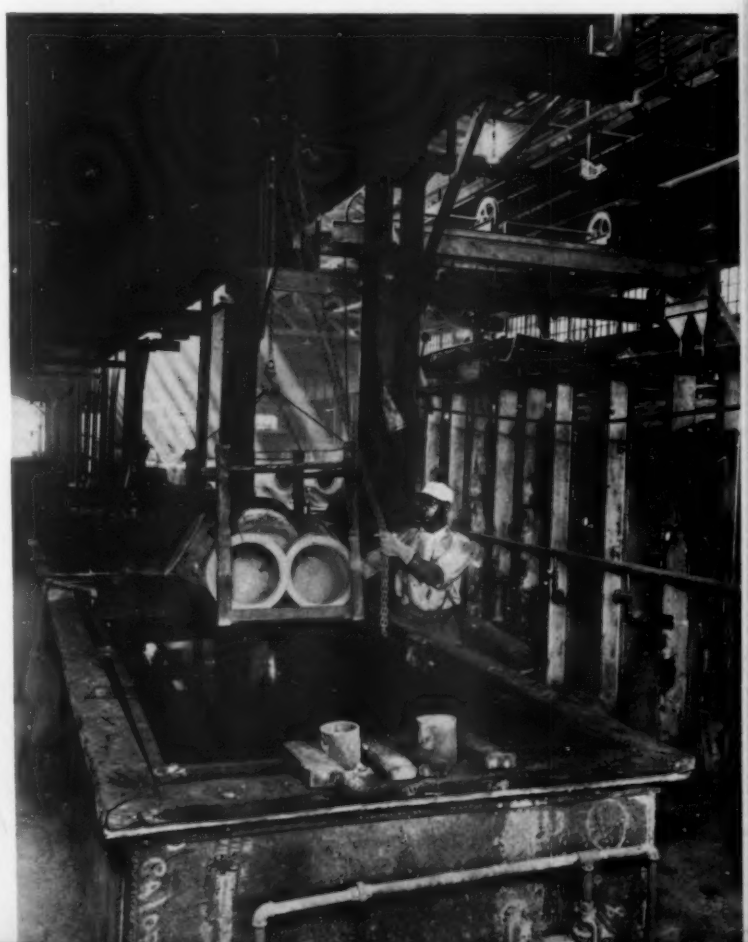
Insulation is desirable but not necessary. Uninsulated tanks operated at 150 deg. F. lose about 180 B.t.u. of heat per hour per sq. ft. of wall surface by radiation and convection. The heat loss from the surface of the liquid is at about the same rate, to which must be added the evaporation loss. Tank wall losses can be reduced by 90% with three inches of insulation during the holding periods. The corresponding reduction in gas consumption would amount to approximately 35%. This with a tank 7 x 4 x 3½ ft: Rockwool, magnesia or multiple ply asbestos is usually employed. A cover is recommended. Further economies can be obtained by using temperature controls and safety pilots.

When the cleaning process is mechanized, two or more tanks are usually incorporated. A hood covers all and pumps force the liquids, through jets or spray nozzles, against the work as it passes on the conveyor. The liquids run back into the tanks for reheating and reuse. The first tank contains the cleaning solution and the second a rinse. To this setup is attached an enclosed sheet metal extension, with open gas flame burners, which acts as a drying oven. These units are so designed as to length of oven and temperature as to give a perfect drying job with the fastest conveyor speed commensurate with complete cleaning and rinsing. Wasteheat from the flues can be utilized to good effect here. Occasionally increased speed is effected by shortening the oven and applying gas-air torches manually to finish the drying of the work at the seams.

Immersion tube heating can be applied to pickling and plating tanks, either metal or wood, containing acid. Here lead tubes are employed. Ordinary lead waste pipe with walls ⅛ in. thick and heavier have proved satisfactory. Very economical installations can be made in the case of 500 and 1000 gallon tanks and using reasonably priced automatic temperature controls with motorized valves, liquid temperature thermostats, safety pilots and gas pressure controls. This procedure renders the installation entirely automatic.

Hot Lead Pipes for Acids

One pickling installation the writer recently saw consists of a lead lined



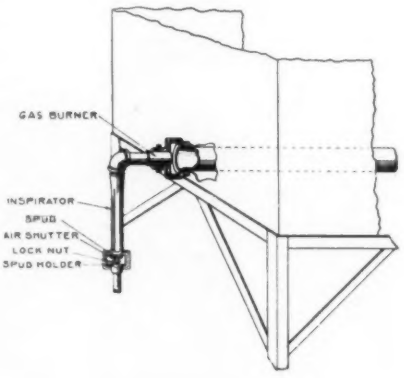
Immersion heating of pickle tanks with gas burners firing into lead coils submerged in the acid bath. Lead lined wooden tanks are employed.

wooden tank 5 x 12 x 3 ft. deep. Heating is accomplished with four gas burners firing into immersion coils of lead pipe 4 inches in diameter. These lead pipes extend the entire length of the tank where they are connected with vertical sections forming stacks. The other ends of the pipes extend through the tank wall and the gas burners fire into them from the outside. Lead supports on the tank floor keep them raised ¾ inch so as to insure circulation while wooden grates protect them from heavy work.

Steam, formerly employed, so diluted the 6% sulphuric acid solution and caused fluctuations in the pickling operation of such a serious nature that it was abandoned. The gas immersion method is most successful and keeps the solution at 180 deg. F. without any difficulty. The work is handled in and out by crane and hoist. Immersion gas burners are also employed to heat the water in the cleaning tank which is 5 x 45 ft. long and 30 in. in depth.

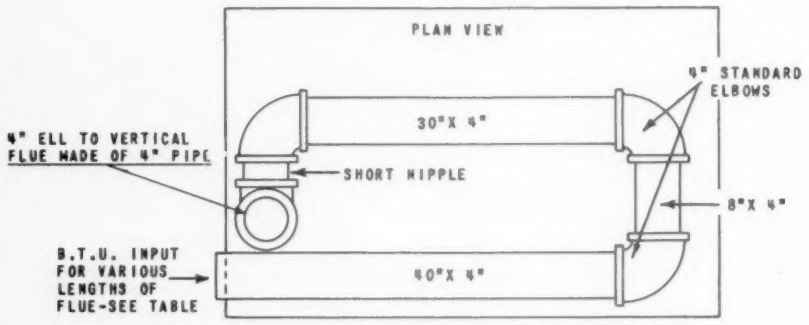
Degreaser and High Pressure Gas

The degreaser is a comparatively new development in cleaning. It utilizes the heated tank to vaporize a cleaning solution. The vapors rising and condensing on the cold work, dissolve the grease and flush the parts free of both dirt and grease. The work comes out perfectly clean and dry. The solvent employed is stable and is said to be many times more effective than gasoline, naphtha and other solvents that cannot be heated or boiled with safety. Here again the gas immersion coil is the ideal way of heating these degreasers.



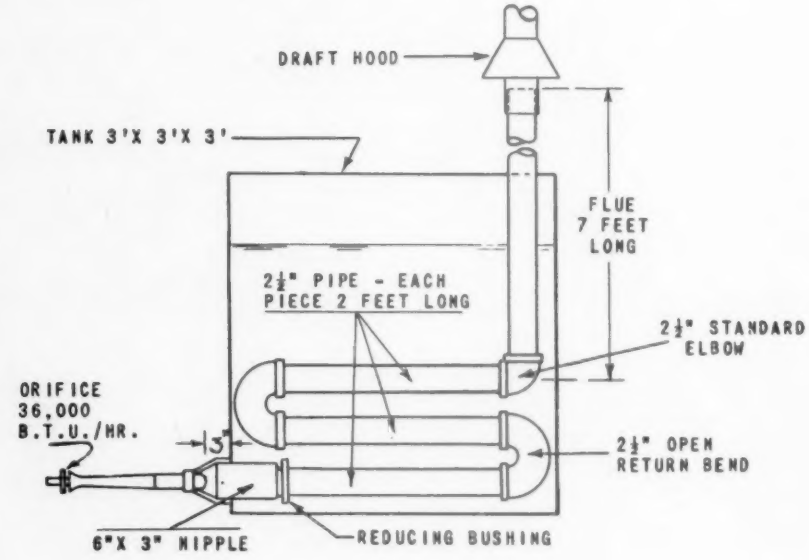
High pressure gas burners are indicated for large installations and when greater speed and better control over combustion are desired. Any one of the conventional gas burner designs—pre-mixing, proportional inspiration or high pressure gas—can be used with equal advantage. Much greater gas burning capacities in tubes of given size are possible with burners in this class. Heat transfer rates as high as 15,000 B.t.u. per sq. ft. of coil area have been reported, and, as newer types of gas firing equipment become available, even greater rates are anticipated. In the case of garages or other locations where explosive gases are present, gas burners are available which are totally enclosed. These are fool proof and there is absolutely no danger of flames or sparks coming in contact with the explosive gases in the room. Pressure gas burners and immersion tubes are also employed to melt heavy materials such as salts for salt baths for heat treating asphalt, wax, etc., and the softer metals used in bearings, die castings, lead baths, electrotype pots, etc., etc.

DESIGN NO. 1
IMMERSION HEATER USING ATMOSPHERIC TYPE GAS BURNER
TANK 48"X 30"



COIL LIES IN HORIZONTAL PLANE NEAR BOTTOM OF TANK

IMMERSION HEATER USING ATMOSPHERIC TYPE GAS BURNER
DESIGN NO. 2



ELEVATION
COIL LIES IN VERTICAL PLANE

Ferrous Metals Committee of A.G.A. Headed by R. G. Guthrie

Robert G. Guthrie, past president of the American Society for Metals, and consulting metallurgist for The People's Gas, Light and Coke Co., Chicago, has been appointed chairman of the Ferrous Metals Committee of the Industrial Gas Section of the American Gas Association, according to an announcement by Ralph L. Manier of Syracuse, who is chairman of the Industrial Gas Section. Mr. Guthrie is one of the country's most widely known metallurgists and has developed among other things extremely delicate methods for taking photomicrographs, and has made many improvements in the application of heat in metallurgical processes.

Distinction Between Municipal Governmental and Ministerial Functions

By Leo T. Parker

IT WILL be interesting to municipal officials, as well as industrial gas company officials, to distinguish between municipal governmental and ministerial functions.

Various courts have held that if no valid state laws specify otherwise then, under the usual and common law, a municipality never is liable in damages for injury to person or property, resulting from acts of its officials or employes who are performing governmental duties.

In fact, in order that municipalities may be relieved from responsibilities, and, therefore, avoid expenses associated therewith it is primarily the reason of distinctions between governmental and ministerial duties or functions.

Governmental functions relate to maintenance, conduction and operation of municipal department *exclusively* for benefit of the citizens, *without profit* to the city and usually without any charge or expense to the citizens excepting, of course, indirect taxation.

In order that readers, who are not fully informed regarding municipal government and departments, may understand municipal department distinctions it is important, first, to know that the functions of a municipality are of three classes, namely governmental, municipal and private.

A municipal corporation is not liable for financial losses and injuries effected citizens resulting from the negligence of its officers when engaged in the performance of a governmental function. Moreover, various courts have held that the maintenance of fire departments, public parks, playgrounds, drains, ditches, and sewers being constructed and maintained by municipalities are governmental functions. On the other hand, it is important to know that the courts have held that municipalities are liable for damages caused private property, or injuries to its citizens, by the creation or maintenance of nuisances, whether in the performance of their governmental or ministerial functions, to the same extent as private persons are.

Exercise of Police Power

It is generally conceded that the exercise of the police power, on the part of a municipality, constitutes a governmental function. Since the preservation of the health, safety and welfare of the citizens constitutes a well defined part of the recognized police power, these acts are governmental functions. Also, it is in the exercise of police power that municipalities are usually given power by state laws to regulate and abate nuisances; to regulate and dispose of garbage, manure, dead animals; and to enforce and carry out sanitary regulations. It is, also, the general rule that a function or duty from which a municipality derives no profit is governmental for which the city is not responsible for the negligence of its officers or employes while performing this function.

State Laws Vary Liability

Until recently the legislatures of states have not enacted laws intended to render municipalities liable in damages for negligent acts of its officials and employes who perform governmental functions. However, since a considerable number of states have in the recent past, and intend to enact laws which render municipalities responsible and liable for injuries and financial losses caused individuals while its officials perform governmental functions, it is interesting to observe the attitude of the higher courts with respect to the validity of laws of this nature.

First, it is interesting to know that the courts are inclined to *broadly* construe any state law that defines liability and responsibility of municipalities while performing specified or listed acts.

For example, in Miller v. New York, 257 N. Y. Supp. 33, a municipality was held liable for death of a citizen caused by the negligence of a municipal employe while operating a municipal automobile used in performance of governmental functions.

Although the counsel for the city contended that a city cannot be held liable for an injury, death, or other financial loss to a property owner or citizen resulting from operation of a governmental department a new state law was introduced before the court. This law provides that *every* city within the state shall be liable for negligence of its officials and employes while operating a municipally owned vehicle used in a governmental department.

The higher court held the law valid, and explained that the law is applicable to every city, town, and village.

State Law Does Not Authorize

Many courts have taken the view that an ordinance authorizing payments to citizens or other persons for negligence by governmental officials, or employes, is void unless such ordinance is authorized by a state statute, or the state constitution. In fact, in one case, 24 S. W. (2d) 938, where a pedestrian was seriously injured by a municipal employe, who was performing a governmental function, the city council passed an ordinance directing the auditor to pay damages to the injured pedestrian.

However, since neither the state constitution nor the state laws authorized the municipality to pass an ordinance of this nature, the higher court held the ordinance void and said:

"We have no such statute in this state imposing liability upon the city for the alleged matters upon which

it is sought to be upheld in this case, and, in the absence of such a statute, there can be no possible ground upon which such alleged liability may be predicted."

Therefore, a city ordinance is void that is intended to render a city liable for financial losses to person or property caused by exercise of governmental functions providing such ordinance is *not* fully authorized by a state law, or a provision of the state constitution.

Law of Injuries

Since few states have passed laws which entitle citizens to recover damages for injuries to person or property, it is advisable to consider other ordinary city responsibilities.

Numerous municipal employes are injured while performing governmental functions. Therefore, various courts have held that primarily a municipality is a governmental agency having limited powers of sovereignty which may be exercised for essentially public purposes pertaining to the administration of the general policy authorized by the law of the state. Moreover, a city will be granted immunity against a claim for damages filed by an employe who is injured in governmental capacity of the municipality.

On the other hand, many acts and functions of a city are done in the exercise of powers *not* governmental, or performed necessarily by reason of laws, but voluntarily assumed and exercised for the private advantage, benefit and profit of its inhabitants. Since, when performing acts of this nature, as the operation, construction and maintenance of a gas plant, the city assumes private interests it is liable *to the same extent* as any private person or corporation performing the acts for profit which may result in an injury to an employe, or other person.

Therefore, when an employe is injured while performing work of a ministerial, or profitable nature, the municipality is liable since under these circumstances it owes its employe, to the same extent as private employers, the duty of providing a safe place to work. Failure of the municipality to do so and which results in an employe being injured, without negligence on his part, renders the city liable.

In view of this well settled law, the higher courts have in many instances held municipalities liable for injuries negligently effected workmen, employed in its ministerial departments, such as in departments of waterworks and power plants, gas plants, electric plants, and the like.

Obviously, also, a municipality is liable for injuries negligently caused by anything, department, or function that is operated for profit. As to whether the injury is negligently effected depends upon two things: Did the injured person fail to use ordinary care to prevent the injury? Did the municipal officials fail to use care to prevent the injury? If the answer to these two questions is negative, then the city is liable. (See 34 S. W. (2d) 842.)

Installation of Equipment

Frequently the legal question arises whether a municipality is liable in damages for any and all financial losses caused by negligence of a public utility, as a gas company, while installing equipment or making improvements of appliances, mains and the like, located in the streets.

The leading higher court decisions of this classification may be divided into two groups. The first group includes acts of which the municipal corporation joined in the creation of a *legal nuisance* by authorization of a state law which is unlawful, or a state law which is lawful but has a natural tendency to naturally create danger and therefore it is properly termed a nuisance.

In such cases the municipality is liable although the public utility received a permit to perform work in the municipality's streets, and the city had no notice or knowledge of negligence of the utility. Under these circumstances the city is liable because it gave permission to create a nuisance and all the damages may be regarded as the consequences.

In the other group of cases the municipal corporation granted a permit to a gas company to perform work in its streets which was lawful and did *not* create unusual danger. However, the project became a nuisance and caused injury through the negligent manner in which the work was performed. The city having knowledge or notice of the existence of the dangerous condition or of the negligent manner in which the work was being performed rendered it liable.

The municipal corporation committed no wrong in granting the permit, and it was not responsible for the negligent acts of the gas company that received the permit. In other words, the municipality is responsible *only* for its own negligence in the maintenance of the street after it has received notice of the existence of a danger, and in failing to compel the gas company to remedy the dangerous condition.

Therefore, municipal officials are bound to use care to eliminate any and all dangerous conditions which may result from negligence of the gas company. The municipality is required only to use ordinary care.

For illustration, in Ehret v. Scarsdale, 199 N. E. 56, it was disclosed that a gas company obtained a permit from a municipality to install a pipe drain under a street. At a point in the street where a drain pipe crossed the gas main, the gas company incased the gas main in the drain.

Several months later it became evident that there was a leak in the gas main. Inevitably gas escaping from the gas main into the pipe drain found exit into the sewer or drain connected with the pipe drain. After discovery of the leak the gas in the gas main was turned off but it was turned off too late to prevent escape of the gas into a near-by dwelling. Two persons who were in the dwelling were found to be dead from inhaling the escaped gas.

Suit was filed against both the city and the gas company to recover damages for death of these two persons. During the trial testimony was introduced proving that municipal employes had inspected the work, and there was evidence that the gas company intended to incase the gas main in the drain pipe at the point where the line of drain pipe crossed the gas main.

The higher court held the city not liable, and said:

"The village is not liable unless it is charged with notice of negligence in the manner in which the work was performed or of danger arising therefrom . . . The village was, as we have said, under no duty to the public to see that the gas mains are properly constructed . . . The village did not inspect the gas main to discover possible leaks, and was under no duty to make such inspection . . ."

It is interesting to know that the higher court held the gas company solely liable, and said:

"The situation of the corporation (gas company) is different. It undertook to do the work of constructing the drain, and it is responsible for the negligence of its servants and employes in the performance of that work."

City Liable for Negligence of Licensee

Moreover, where a city licenses a person or firm, as a contractor, to do an act dangerous in itself, or has notice that its licensee has acted in a negligent manner and left its streets

(Continued on page 68)

Sales Accomplishment for 1936

Analysis of Percentage Increases

Typical display on the floor of the Kansas City Gas Co.

By Chas. D. Greason

The Gas Service Company

Kansas City, Mo.

NINETEEN THIRTY-SIX proved to be an outstanding year for the new business departments of The Gas Service Company. Gross sales of this company last year were higher than in any year since 1930 and the third highest of any year since the company was organized in 1925. The total gross sales of the combined new business departments in the company properties amounted to $2,747,506, all of this equipment being installed during the year.

Gas Service Company properties with new business departments are operated in Kansas and western Missouri while the company has two smaller properties in Nebraska.

Following are some of the major accomplishments of the departments for the year:

Increased appliance and installation sales and rentals, 1936 over total sales and rentals in 1935 amounted to $827,239.

Per cent of increase, sales and rentals, 1936 over 1935, 43%.

Increase in domestic customers in 1936 over 1935, for all properties amounted to 3,571.

Increase in industrial customers in 1936 over 1935, for all properties amounted to 89.

Total increase in both domestic and industrial customers in 1936 over 1935, or all properties amounted to 3,660.

Average installation sales per customer in 1936—$11.53.

Increase in average appliance and installation sales per customer in 1936 was $3.25.

Total number of appliances sold and rented—house heating—domestic—commercial and industrial—23,433.

Increase in number of appliances sold and rented, 1936 over 1935—2,030.

While the company's gross sales in 1936 were not as great as during the years of 1929 and 1930, sales were, however, higher than in two previous banner years, 1926 and 1928. The gross sales were $626,220 higher in 1936 than in 1928.

Company officials are counting on greater production by the salesmen in the properties in 1937. This year gives every promise of being a better year for the departments than last year and with everything indicating an improvement in business it is believed company new business sales will show an increase. New merchandising plans soon to be announced by F. M. Rosenkrans, general new business manager of the company, and the continuation of many of the present plans and policies, it is believed, will aid the departments in achieving greater results during the ensuing year.

In 1935 the company inaugurated the plan of renting equipment to customers. A rental plan on water heaters was put into effect in March while the plan of renting conversion burners, unit heaters and large capacity circulating heaters was put in effect in August.

The value of equipment rented in the months the plan was in effect in 1935 amounted to $708,687. With the plan in effect during the entire twelve months of 1936 the value of equipment rented was less than in 1935, the total value being $687,049. This shows that the company salesmen are concentrating on the outright sales of equipment or attempting whenever possible to sell equipment through the company's time payment plan. However, the rental plan has aided in securing a large amount of additional business. The value of equipment sold in 1936 was 75% of the total business obtained by the sales departments.

The largest number of gas designed furnaces and boilers ever added to the company lines in a year's period were sold by the sales departments of this company in 1936. Total sales of furnaces and boilers amounted to 2,085. The sale of gas designed equipment in practically all of the company's properties increases year after year and this is primarily due to the fact that customers have given gas heat a trial for a number of years through the use of conversion burners and, because of complete satisfaction, have learned of the advantages in efficiency and savings that can be obtained through the installation of equipment designed especially to burn gas. This company's policy has been to install gas designed equipment whenever possible, even considering the replacement of

This is one of the poster boards used by the Kansas City Gas Company during July and August in 1936 advertising gas burners and calling attention to the fact that customers would need heat when winter arrived.

conversion burners—because the former is considered a more permanent sale.

The Gas Service Company new business department were particularly active in selling new ranges during the year. A number of important range campaigns were held, some of them for short duration of ten and twelve days. Total range sales for the year amounted to 8,868, an increase of 3,225—1936 compared to the previous year.

The departments were successful in selling and renting a total of 4,911 water heaters during the twelve months of the past year.

The sale and rental of unit heaters was the greatest in 1936 for any year since the company was organized, a total of 502 unit heaters being added to the company lines last year. There were 127 unit heaters sold and rented by the new business department of the Kansas City Gas Company.

Total sales of large capacity circulating heaters for 1936 in all company properties amounted to 3,553. There were 710 sales and rentals of conversion burners made during the year and this number installed. Other heating equipment added to the company lines was 2,257 radiant heaters.

The company obtained 4,263 new services for 1936 and in addition 2,372 services were reconnected. Many of the reconnected services were for customers who have not been using gas on the company lines for a number of years.

NEW BUSINESS SALES AND RENTALS THE GAS SERVICE COMPANY BY MONTHS—1936

	Total Sales	Sales Value Appliances Rented	Total Sales and Rentals
Jan.	$114,741	$35,468	$150,209
Feb.	137,175	56,618	193,793
March	117,674	44,838	162,512
April	130,730	54,670	185,400
May	125,408	33,347	158,755
June	151,428	30,542	181,970
July	175,108	12,666	187,774
August	181,176	11,492	192,668
Sept.	233,587	28,915	262,502
Oct.	258,415	175,252	433,667
Nov.	233,037	135,067	368,104
Dec.	201,978	68,174	270,152
Totl.	$2,060,457	$687,049	$2,747,506

List of Appliances

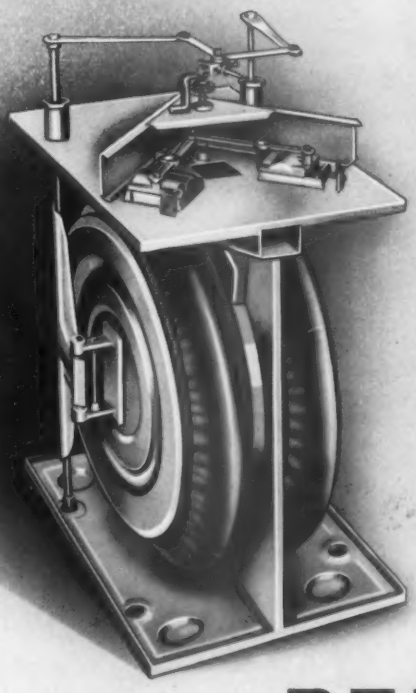
Following is the NET total number of various types of appliances sold and rented by the New Business Department of the Gas Service Company in the year 1936:

Appliances	No. of Units
HOUSE HEATING	
Gas Designed Furnaces and Boilers	2,085
Conversion Burners	710
Unit Heaters	502
Cooling Systems	1
SPACE HEATING	
Radiant Heaters	2,257
Circulating Heaters	3,553
Gas Radiators	12
COOKING	
Ranges	8,868
Cookers	152
Hot Plates	104
Refrigerators	6
Incinerators	43
WATER HEATERS	
Storage Systems	4,911
Tank Heaters	30
LAUNDRY	
Laundry Stoves	42
Clothes Dryers	1
Washers	2
Ironers	1
COOKING—COMMERCIAL	
Ranges	44
Bake Ovens	5
Broilers	4
Griddles	4
Toasters	1
Urn Burners	19
INDUSTRIAL	
Boilers	1
Burners	75
TOTAL	23,433

A poster display used by the Kansas City Gas Company that was posted throughout the city between Christmas and New Year's, featuring the modern gas range.

COST CONTROL

through



Only your meter history records, logically classified for comparative performance, can show how modern your meters are . . . the itemized cost of maintained accuracy in gas measurement . . . the information needed to evaluate the actual return on your meter dollar.

The advances which persistent research has made in the scientific knowledge of gas measurement . . . and their application in the development of American meters . . . make today's meter standards new standards in the low cost of **MAINTAINED** accuracy.

They offer an opportunity for reducing costs as a part of your modernization program.

PERFORMANCE CONTROL

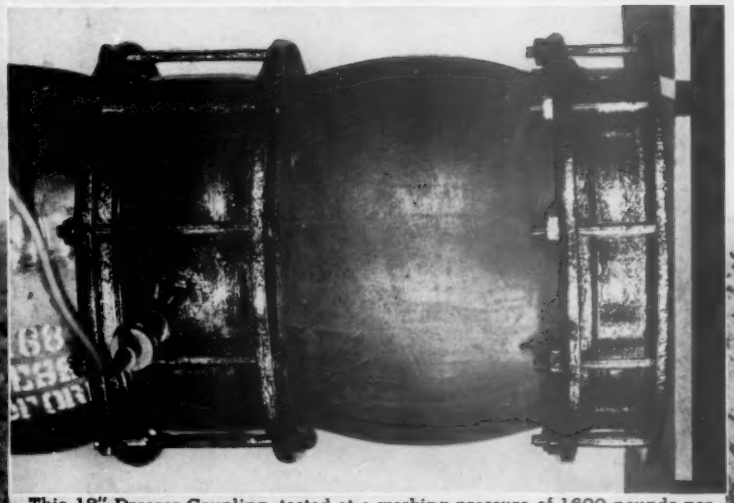
796

Established 1836

AMERICAN METER COMPANY

INCORPORATED

GENERAL OFFICES: 60 EAST 42ND STREET, NEW YORK, N. Y.



This 18" Dresser Coupling, tested at a working pressure of 1600 pounds per square inch, remained absolutely tight even though the pipe bulged, thus proving that its design more than met requirements. (Below). On the great 24" Chicago line (approximately 1000 miles long), Dresser Couplings were made with a positive *predetermined* strength sufficient to withstand a similar test pressure of 1600 pounds per square inch.

Predetermined STRENGTH

How strong do you want your pipe joints? Whatever your requirement, there is a Dresser Coupling to meet it—with a strength scientifically *predetermined.* That's because Dressers are assembled from standardized, precision-made parts . . . the strength of which can be varied to meet different working pressures! Guesswork is thereby eliminated . . . joint strength becomes a matter of mathematical formula.

Strength is only one feature of Dresser Couplings. Folder No. 355 describes others. Ask for it by number.

S. R. DRESSER MANUFACTURING CO. • BRADFORD, PA.

In Canada: Dresser Manufacturing Company, Limited, 60 Front Street, West, Toronto, Ontario

Pipe Corrosion and Coatings

Soil Analysis

Part 8

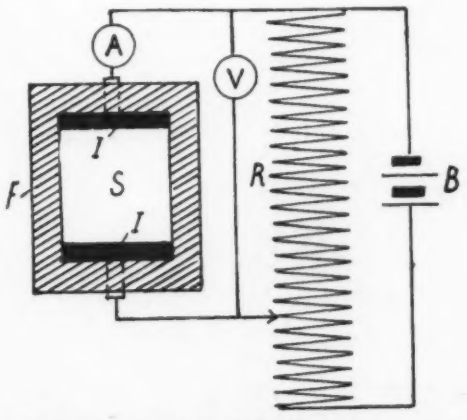
By Erick Larson

THE chemical and physical laboratories have become the modern nerve center of industry, where diagnosis not only determines the present status but may be used to prescribe for the future. In the past, the scope of the gas industry laboratory has been generally confined to plant operation. The future will witness an extended use by gas engineers of chemistry and physics in the design and operation of transmission and distribution systems. The application of chemistry to the problem of corrosion is by no means new, but the development of various methods for determining the corrosivity of a soil is comparatively recent and is rapidly gaining in popularity and acceptance. The methods outlined are preferably viewed as having been thoroughly tried and sufficiently accurate to warrant general adaption but lacking in sufficient experience to be standardized. Local study may develop new test methods, practices of merit or refinements in existing procedures. Until the changes have become generally adapted comparison with independent investigators is facilitated by adding the local developments to the generally determined factors. The chemist possesses the key position for eliminating the frequently quoted phrase, "Our conditions are different". The laws of nature are universally fundamental. Standardization in many operations and methods will not make automatons of all but will allow more thought and effort to be placed where the greatest value will result.

Test Voltages

The measurement of soil resistivity in the laboratory is more adaptable to securing results under standard conditions of temperature and moisture content than field procedures. All generally used laboratory methods follow the practice of imposing a voltage on the sample from an external source of electrical energy using suitable instruments for measurement. The magnitude of the test voltages commonly used are considerably in excess of the values which result from galvanic action. Ewing[1] states, "E. R. Shepard's measurements of the potential between mill scale and bright iron, or between electrodes in puddles and coarse granular soil, seldom gave values above 0.5 volts." Higher voltages than this, although found, are not common. Ewing continues, "Measurements made by the writer and others indicate that for current densities up to one milli-ampere per square centimeter, which corresponds to a penetration of 0.46 inch in one year, the total polarization on anode and cathode is seldom greater than 0.6 volts."

The voltages used in the laboratory are considerably in excess of the values just mentioned and, therefore, from the previous description of galvanic theory an error may originate because of the greater polarization occurring at lower potentials. While it is true the greater potential could more readily break down the polarizing films formed, there are other factors, which may require consideration. Physical forces are more active in the field than in the laboratory. The close correlation between the electrical resistance characteristics of a soil using comparatively high voltages and actual experience with the life of metal pipe in that soil may also be affected by a combination of galvanic and stray current electrolysis occurring in the field. The values used in laboratory soil tests would more frequently be comparable with the combined values of stray current and galvanic electrolysis than only with galvanic corrosion. However, the fact remains that the correlation between the rate of corrosion and electrical characteristics in any soils occurs with sufficient frequency to suggest that there is still some lack of knowledge concerning a combination of the factors involved. As long as the testing methods are of value in predicting the intensiveness of corrosion, the reason for the occurrence of differences which would not affect interpretations or fundamental theory are more a matter of interest for the theoretical chemist than the practical surveyor. As a conclusion it may be said the use of higher test voltages that ordinarily result from galvanic action on buried gas piping are justified because of the numerous correlations found. The voltages to which this conclusion would apply are 3 or more volts.



"Putnam Soil Resistivity Cell." B, battery or source of current. A, ammeter. V, potentiometer. F, cubical cell. I, electrodes. Current read after reaching a steady value.

The use of as low voltage as 0.5 may also decrease the effect of polarization in laboratory tests due to the

(1) "Accomplishments in Determining Soil Corrosiveness" by Scott Ewing Presented before the A.G.A. Distribution Conference, April, 1932.

resistance of the soil decreasing the current density. Especially when the area of the anode is small, compared with the cathode current densities resulting from low voltages may result in polarization being practically insignificant. The lower voltage may increase the time required for loss of a given quantity of metal on equal areas of exposed surface or with an equal time would produce a smaller loss of metal. This discussion of polarization applies to the use of direct current.

The voltages used have been compared to those resulting from a combination of galvanic and stray current electrolysis. The interpretation, however, of either field or laboratory tests is not to be considered as representing a rate of corrosion comparable with stray current electrolysis, but only that caused by such natural causes as chemical or galvanic corrosion. Stray current electrolysis is viewed as a more controllable factor than other causes of corrosion and also the value of a stray current is directly measureable. Corrosion resulting from other causes than stray current electrolysis must have the rate of expected metal loss assigned by such indirect but correlated measurements as electrical or chemical characteristics of a soil.

The computation of electrical resistance involves the formula resistance equals the electromotive force divid-

$$R = \frac{E}{I}$$

ed by the current. The electromotive force is measured in volts and the current in amperes. The resulting ohms of resistance is converted into specific resistance by dividing the total ohms by the area of the anode in square centimeters. The area is the total surface in direct electric contact with the soil. Some equipment is designed so that only one surface of a disc or cube is in contact with the soil.

Temperature Correction

Soil resistance varies with temperature. For practical purposes the temperature coefficient of soil resistance may be considered a constant, being approximately 0.015 ohms per degree Fahrenheit from the base temperature of 60 degrees F. The corrected resistance at 60 degrees F. as compared with that actually measured in a given test at higher temperatures will be greater in value. The corrected resistance at standard temperature will be less than the test or field values when the observations are made in soils having a lower temperature than that used as a base.

The formula for correcting resistances is:

$$R_{60} = R_t \div [1 - 0.015\ (t - 60)]$$

R_t is resistance in ohms at temperature t.

R_{60} is resistance in ohms at 60 degrees F.

In the field a single daily reading of temperatures at each test level in each soil type is usually sufficiently accurate for practical purposes. Each type of soil has a specific coefficient of heat conductivity and therefore, even though exposed to the same surface temperature, different soils may have dissimilar temperatures. Due to the varying proportions of the ingredients in a single soil type the coefficient of heat conductivity may vary between certain limits. However, the daily variations in temperatures of the soils would be within rather narrow limits and, therefore, considering the probable error from all factors, the refinement resulting from more frequent reading of the soil temperature would not ordinarily justify the added cost. The extreme variations between air and soil temperature differences precludes the use of atmospheric temperature.

The significance of recorded resistances is more easily interpreted by reference to whether corrections have been applied or not.

Moisture Effect

The effect of soil moisture content on resistivity has been discussed in previous sections. In the same type of soil the resistivities of various samples with the same moisture content seldom agree and the variations are sufficiently large in value to require a separate laboratory determination in each locality surveyed regardless of experience in other areas with the same soil type. A laboratory test will provide a correction factor to be applied to the field resistivity value when the moisture content at the test site is known. The number of laboratory determinations required in a single soil type would depend upon the consistency found in the initial tests. Should the first 3 or 4 tests made on samples from widely separated sites in each area produce values differing by amounts, which would not materially affect results, no further work is ordinarily required.

Should test results show such large variations that part of the area may require a much superior protection than other sections, it is desirable to secure additional samples to more clearly define the boundaries unless the better protection is to be used in all sections.

A frequent reason for large variations in resistances of samples from a visually outlined area of a single soil type is differences between the sub-surface and surface soil stratas. This change may be evident to the field man during the actual progress of a survey in which case the surveyor may be given the authority to decrease the spacings without waiting for laboratory tests to support observations.

Moisture Content Determination

Frequent mention has been made of the effect of moisture content. A standard method of securing this factor is essential to facilitate accurate comparisons. A common test for determining soil water holding capacity is that described by Slater[2]. "A 30-g sample of soil contained in a screen-bottom box is saturated with water, centrifuged for 40 minutes at 1,000 times gravity to produce a standard packing and again saturated with water. After allowing the sample to naturally drain for 18 hours in a saturated atmosphere the box containing the soil is wiped dry, weighed, dried in an oven at 105° C. and reweighed. The loss in weight was expressed as percentage of the weight of the oven-dried soil".

Not all laboratories are equipped with centrifuging apparatus but packing of the soil secured by tamping or several wettings and dryings similar to the puddling of trenches may be substituted. While not as accurate for comparative purposes, the substitute methods may provide a compactness as nearly approaching field conditions as the more scientific centrifuging which does not claim to reproduce field conditions. Centrifuging under specific conditions on the average provides a more accurate comparison with samples from other localities.

When it is desired to reproduce field compactness as accurately as possible, the apparent specific gravity of a solid undisturbed ball of soil may be determined by displacement and the laboratory sample used for determining water holding capacity compacted until it has an equivalent apparent specific gravity. This latter is accomplished in one operation by filling the test box of known volume with a given weight of soil. The soil is then compacted into the box in layers to provide a uni-

(2) "A Laboratory Study of the Field Percolation Rates of Soils", C. S. Slater and H. G. Byers, Technical Bulletin 232, U. S. Dept. of Agriculture, 1931.

form density until the soil fills a space previously computed as producing the gravity desired.

Determining the soil water holding capacity with a compactness approaching field conditions is not usually resorted to unless the per cent moisture content and rate of corrosion are erratic and an explanation is desired.

Saturation

A method described by Rogers in a paper entitled "Theory of Soil Corrosion" appears to give comparable results although compacting of the soil is not accomplished under standard conditions.

Rogers states, "The saturation point of the soils is determined by a method developed by the Gulf Laboratory. The essential apparatus consists of cylinders for handling the soils and the plunger for packing the soils. The plunger consists of a revamped bottle capper. The disc on the bottom of the plunger is one inch in diameter and fits snugly into the inside of the brass cylinders. These cylinders are one inch in inside diameter and two inches high. The bottom of each is filled with holes 1/32" in diameter.

In making the soil moisture determinations the soils are packed by the plunger into the cylinder. Approximately ¼ inch of space is left in the cylinder for the soils if they swell. After the soils have been weighed, dried and reweighed, they are placed in water and allowed to soak for forty-eight hours. It has been found that this time is the minimum to allow for thorough soaking. After soaking, the soils are taken from the water and allowed to drain for a short period. A piece of filter paper is placed over the top of the cylinder and all of the water is pressed from the soil. The cylinder of soil is then wiped dry and immediately weighed. From those data, the amount of water taken up by the dry soil is determined. This is known as the saturation point. The method has been found to give as reproducible results on soils as is expected of other methods which are used to arrive at a somewhat similar value. Data showing the reproducibility of the results on a number of soils by the method are given in Table No. 1."

TABLE NO. 1

RESULT OF CHECK TESTS OF SATURATION VALUE OF SOILS

Soil Number	31	27	43	94	81	63
	Per Cent Water for Saturation					
	18.0	14.4	24.9	22.5	23.2	15.3
	19.0	15.7	22.6	22.8	25.2	15.9
	16.4	15.7	25.1	16.6	20.8	15.2
	19.1				23.9	16.1
	18.6				21.8	
Average	18.2	15.3	24.2	21.3	22.9	15.7
Soil Number	55	96	87	66	99	64
	Per Cent Water for Saturation					
	1.4	27.5	23.0	25.7	20.1	21.6
	1.1	22.9	28.2	22.8	21.9	21.0
	1.9	25.0	28.1	26.3	20.0	18.1
	1.6	26.1	29.0	23.6	24.7	19.2
		26.5	25.2			19.7
Average	1.5	25.6	26.7	24.6	21.7	19.8

The term "Visually Saturated" has been used by some investigators to designate a soil moisture content, such that on standing a slight amount of water will rise to the surface and remain as free water.

Volume-Weight (Apparent Specific Gravity)

Soils being mixtures of substances each with a definite specific gravity are described in terms of volume-weight. The volume-weight of undisturbed lumps of compacted soils may be determined by immersing the dry lumps in a dish filled with mercury. The volume-weight of the lump may be calculated from the weight of the mercury displaced. Six to eight determinations which closely agree in value are averaged to secure the volume-weight. The volume-weight is more comparative if determined under moisture equivalent conditions and after drying the sample in an oven at 105 degrees C.

Moisture Equivalent

Moisture equivalent is defined by Briggs and McLane[3] as the moisture retained by a moist soil under a centrifugal force of 1,000 times gravity. This particular factor has not been generally determined and is included to indicate a standard which may be used for comparing the moisture retaining properties of a soil under certain physical conditions.

Volume of Voids

The expression "Volume of Voids" designates the total measurable space occupied by air in a mass of soil compacted by a definite force and having a definite moisture content. The value representing the volume of voids may be calculated by subtracting from the volume of moist soil the volume occupied by the soil particles plus the volume of water contained in the soil. The volume of voids is expressed as a percentage of the space occupied by the moist soil. The volume of the dried soil particles may be calculated from their specific gravity. The volume of the moist soil is determined under moisture equivalent conditions. There may be repeated moistenings and centrifugings in excess of 1,000 times gravity but the final centrifuging should be at 1,000 times gravity.

Dispersion Ratio

Denison[4] has given a modified method of Middletons[5] for determining the dispersiveness of silt and clay. "A 10-g sample of soil contained in a 1-liter glass cylinder was moistened with distilled water and after 18 hours was suspended in 1 liter of water by shaking end over end 20 times. The suspension was then allowed to settle for 3 minutes and 45 seconds, when a 25-ml sample was pipetted at a depth of 30 cms. From the dry weight of the residue obtained by evaporating the pipetted section, the total weight of silt and clay in suspension was calculated. This quantity, expressed as a percentage of the weight of the sample, has been designed by Slater and Byers[5] as the 'Suspension Percentage'. The ratio of the silt and clay so determined to the total silt and clay obtained by mechanical analysis is called the 'Dispersion Ratio'."

Shrinkage

The shrinkage of a soil is important in corrosion because of the physical force exerted on the pipe or protection surface tending to remove inhibitive films, products of corrosion which tend to decrease the rate of further action and to damage protection. I. A. Denison has recommended that volume shrinkage be determined by accurately weighing a thoroughly dried sample of soil and adding sufficient water, also accurately weighed, to produce a plastic mass. A mold of definite known dimensions and weight, having a volume slightly less than the soil sample is filled with the mixture and weighed. The weights of soil and water in the mold are calculated from the proportions existing in the original mass. The sample is allowed to air dry for

(3) "Moisture Equivalent Determinations and Their Application", L. J. Briggs and J. W. McLane, Journal American Society Agron. 2, pages 138-147, 1910.
(4) "Corrosion of Ferrous Metals in Acid Soils", by I. A. Denison and R. B. Hobbs in National Bureau of Standards, Research Paper 696.
(5) "Properties of Soils Which Influence Soil Erosion", H. E. Middleton, Technical Bulletin 178, U. S. Dept. of Agriculture, 1930.

two days and then dried in an oven at 220° F. The resultant volume is found by mercury displacement, the mercury displaced being weighed and its volume at laboratory temperature being calculated from the density.

The water used to bring the soil to the original plastic condition may not be an amount required for complete saturation. The total shrinkage may be calculated by determining the amount of water required for full saturation and increasing the determined shrinkage in direct proportion to the additional amount of water required beyond that necessary to form the original plastic mass.

Chemical Analysis

Total Acidity

Ewing[6] describes a laboratory test for total acidity as follows:

"After the soil in the bags has dried it should be pulverized and passed through a coarse (20-mesh) sieve.

"The following method, which is a modification of the titration method described by Denison[7] is a convenient and sufficiently reliable method for determining the total acidity.

"A 5-gram portion of the air-dry soil which has been pulverized and passed through a 20-mesh (per linear inch) sieve, is placed in each of two 25 x 200 mm. test tubes, 25 ml. of normal sodium chloride solution is added to each tube. One ml. of 0.2N sodium carbonate solution is pipetted into one tube and 2 ml. into the other. (One ml. is equivalent to four milliequivalents of acid per 100 grams of soil for the 5-gram sample). The pH of the solution in the more alkaline tube is then determined with a Hellige Microcomparator, using Cresol Red as the indicator. If the pH is found to be below 7.2, the lower limit of the indicator, 2 ml. more of the carbonate solution is added to each tube and the process repeated until the pH of the more alkaline solution is above 8. The tubes are now allowed to stand, with occasional shaking, until the solutions are in equilibrium with the soil and show no further change of pH with time. The pH or the solution in both tubes is then determined. Usually the resulting pH values are near enough to pH 8 that by interpolation or extrapolation the amount of alkali required to bring the soil to pH8 can be determined. For example, if 12 milliequivalents (3 ml.) of the carbonate solution give a pH of 7.7 when in equilibrium with the soil and 16 milliequivalents (4 ml.) give a pH of 8.1, the acidity of the soil would be 15 milliequivalents per 100 grams. The titration curve is assumed to be a straight line through the range of interpolation or extrapolation. The reason for titrating to pH 8 instead of pH 7 is that the point of inflection of the titration curves for most soils is near the former value. While the results of this method are not accurate to better than about one milliequivalent of acid per 100 grams of soil, they are sufficiently close for the purpose, because acidity measurements of samples taken adjacent to each other in the field frequently vary more than the error in this method of measurement. Some soils seem to require a longer time than others to reach equilibrium. This time should be determined for the particular group of soils that are being tested.

"If any of the samples are found to effervesce freely when treated with dilute hydrochloric acid, these samples need not be tested for acidity and their acidity may be taken as zero."

Some soils require days for the distilled water samples to clear by settling. Some of these solutions cannot be clarified by filtering and in such cases pH measurements are usually not attempted.

Whitwell[8] has furnished the following table showing a comparison of the pH resulting in a given time with the use of NaCl-CaO powder and KCl-Na_2CO_3 when testing a sassafras loam. The conclusion was, "That equilibrium is reached quicker with CaO and also that perhaps K replaces more H than does Na. Further tests with CaO show that 3 hours is not always sufficient time."

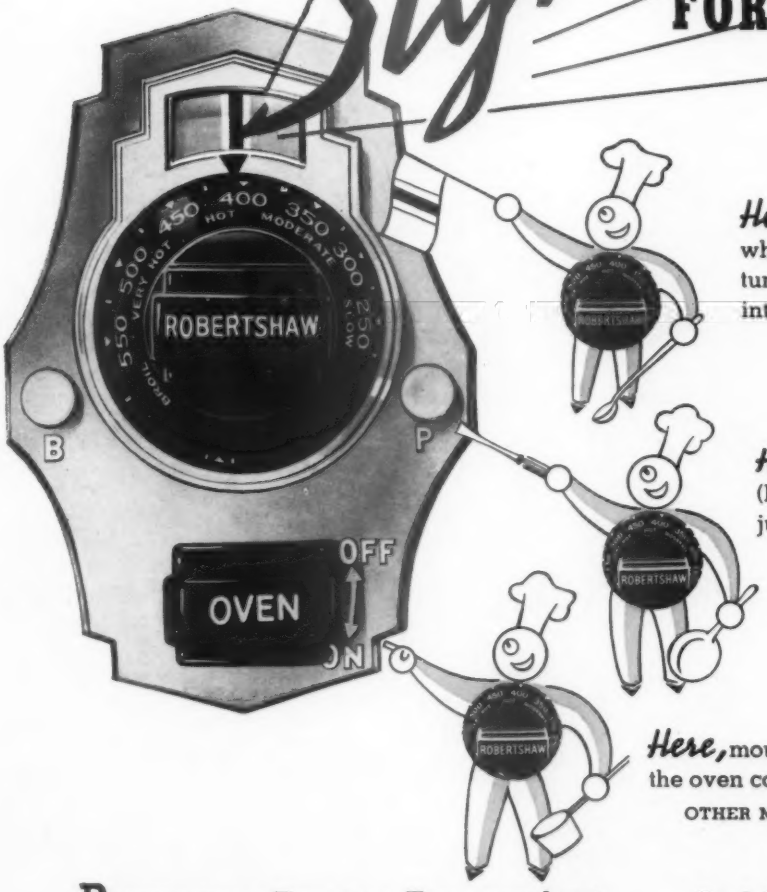
Salt Added	*pH After 3 Hours*	*pH After 40 Hours*
None	..	6.6
3.7 me. CaO	7.6	7.6
7.4 me. CaO	8.4	8.3
3.7 me. CaO	7.6	7.6
7.4 me. CaO	8.4	8.3
1.85 me. CaO	7.0	..
5.55 me. CaO	7.8	..
9.25 me. CaO	8.8	..
10.1 me. CaO	9.2	..
1.57 me. Na_2CO_3	6.5	6.8
3.14 me. Na_2CO_3	6.9	6.9
4.71 me. Na_2CO_3	7.5	7.2
6.28 me. Na_2CO_3	7.8	7.4
8.0 me. Na_2CO_3	8.3	7.8

Whitwell's comments on the above described method established by Denison are as follows: "It is far from perfect, is time consuming and the mechanism not thoroughly understood, but with a given soil provides duplicate results and is generally reliable in giving a measure of the acidity although there is some doubt as to whether it gives the total available acid or not. The method is based upon the fact that soils are buffered considerably, meaning that they are capable of delivering a water solution of a certain pH over many washings after which the acids are washed out. The influence of time and age have effects which promote soil changes which enable the soil to continue to deliver acid solutions. However, with the addition of KCl or NaCl as done in this method, K or Na enters into the acid molecule replacing H_2 which unites with the Cl forming HCl which is reacted upon by the CaO or Na_2CO_3. The addition of KCl or NaCl is supposed to liberate all of the replacable H_2 from the acids present in the soil and consequently depress the pH of the water solution after which time the CaO or Na_2CO_3 reacts upon the liberated acids. The NaCl or KCl also perform the function of breaking down the colloids of the soil thus aiding in settling; however, this process in many acid soils is slow, requiring up to 72 hours to completely react. It was found that the CaO-NaCl combination was slower to act than the Na_2CO_3-KCl combination as shown in the table. The method used followed this routine. Samples of the collected soil specimens were measured out in a small mold and introduced into test tubes of 50 cc. capacity. Twenty-five cc. of distilled water was added and a dose of NaCl-CaO or Na_2CO_3-KCl added by means of a calibrated spoon. The tube was then corked and shaken violently at 8 hour intervals, after allowing sufficient time for equilibrium and settling—usually two days, the pH of the water was determined and if below 7.8 another dose of reagent was added and the process repeated until at least 7.8 pH was reached. The sample mold used was a small piece

(Continued on page 70)

(6) "Suggestions for Making and Using a Pipe Line Corrosion Survey", by Scott Ewing at the 1935 Convention of the A.G.A. Natural Gas Department.
(7) "Methods for Determining the Total Acidity of Soils", by I. A. Denison in the Bureau of Standards Journal of Research, Vol. 10, March, 1933.
(8) George E. Whitwell, Research Engineer, Long Island Lighting Company, Bay Shore, N. Y.

THE OVEN-HEAT-CONTROL THAT *Signals* FOR ATTENTION



Here in the Thermal Eye window, when the oven reaches the temperature set by the dial, a red signal comes into view

Here on the bezel, the oven by-pass (B) and safety pilot (P) are easily adjusted with a screw driver

Here, mounted on the bezel of the control, is the oven cock

OTHER MODELS FOR EVERY SERVICE NEED

ROBERTSHAW THERMAL EYE oven heat control provides your salesman with an entirely new approach in gas range selling.

Now he has something exciting to show, something real to say: "Here, madam, is the event of the year in gas ranges—a great improvement that *you* will appreciate!"

And Thermal Eye control backs him up with action. The prospect sees this new control actually *signal* when the oven reaches the temperature set on the dial.

See that *your* ranges are equipped with this attention-getting control. It will energize your selling.

OVER 2,800,000 IN USE

ROBERTSHAW THERMOSTAT COMPANY, Youngwood, Penna.

ROBERTSHAW OVEN-HEAT-CONTROL *with the* **Thermal Eye**

Modern gas refrigerator.

How Home Service Aids Selling

By Special Correspondent

WITH home service activities coming in for more attention all the time, people are asking, "Just what does a home service director do?" And with the new better-than-ever Servel Electrolux on the market, salesmen are wondering, "Just how can the home service department help me sell refrigerators?"

Let me tell you a story.

Jasper Green is a refrigerator salesman (we will pretend). One bright winter's day, he started out full of New Year's determination to place Servel Electrolux refrigerators in every house along Elm Street. It was such a nice day that he didn't find many people at home; but at one small, neat bungalow, a sweet-faced, gray-haired woman opened the door to him.

"Good morning, Mrs. Goodrich," he said, knowing that a Mrs. Goodrich who might need a new refrigerator lived in this bungalow. Mrs. Goodrich listened politely to Jasper Green's explanation of why he had come to call, but she interrupted after a minute to say, "Mr. Green, we're just in the midst of housecleaning, and I really can't take the time to hear all about your refrigerator this morning."

A little discouraging, but it didn't daunt Jasper. "Let me help you," he offered. "I used to be a great help to my mother when she cleaned house." Well, that was a new one! What would salesmen think of next! Mrs. Goodrich really was busy and could use a little help, so she let Mr. Green come in to lend a hand.

Jasper recognized the house. He had never been there before, but he knew that look of frugal neatness, that shining cleanliness. Later he saw the kitchen, and he recognized it —large, dark, neatly kept, but with equipment that was a relic of horse-and-buggy days.

"Where do you keep your refrigerator, Mrs. Goodrich?"

"It's on the back porch. We don't use it much in this weather, for even the milk and butter will freeze out there. We'd like an automatic refrigerator all right if we could just afford it."

You know what Jasper's reply to that would be, and you know that, being a good salesman, he didn't use any "high pressure". But a week later, Mrs. Goodrich found an invitation in her post box to a special cooking school demonstration at the gas company offices. Jasper had talked to the home service staff about Mrs. Goodrich.

At the "cooking school", Mrs. Goodrich was greeted by a friendly woman who introduced herself as the home service director, and there with several of her own neighbors, she heard a talk and saw a demonstration on modern meal-preparation. She was very much interested in the model kitchen—what woman isn't? That gay room, so light, so compactly arranged, with the refrigerator right next to built-in cabinets instead of outside on a cold back porch . . . how nice if they had a kitchen like that. . . . She watched the home service director using batters that had been stored in the refrigerator (the demonstration that day happened to be on baking), thinking that was something she couldn't do in her back-porch ice box. Her family liked muffins and hot breads, but she usually thought of mixing them too late for supper. She was impressed, too, with the vegetables that had been kept in the gas refrigerator. She had had to throw away some new cabbage and some green beans just that morning because they had become frost-bitten out on the back porch.

Towards the end of the demonstration, in came that nice Mr. Green who had helped her shake out rugs. He talked to them about the 1937

refrigerators with their one-piece construction (and she had already been admiring the beautiful simplicity of the design), the wonderful efficiency of refrigeration; and he also told them about the low operating cost of a gas-operated refrigerator, why the cost was smaller than ever with the new models.

Mrs. Goodrich began to visualize a shining white Servel Electrolux refrigerator in her kitchen. As the days went on, the idea grew in her mind, until she began planning just how they could manage one. Especially when she had to go marketing in the sleet and cold, she yearned for the convenience of a refrigerator to store extra supplies and thus combine shopping trips.

One night she and Mr. Goodrich went to a buffet supper in the gas company office given by the friendly home service director and her staff, and Jasper Green was there to welcome them. Mr. Goodrich did not think they needed a new refrigerator; meals which they had at home seemed good enough to him. But he was impressed by the frozen dessert that was served, and he had a third helping of the refrigerator rolls which were passed around, piping hot. He listened to Green's explanation of the superior construction in this 1937 refrigerator, the wonderful simplicity of the freezing-by-heat principle, the life-long efficiency of the unit that had no moving parts.

While Mrs. Goodrich looked at the refrigerator, the home service director said to her, "Mrs. Goodrich, it's positively unbelievable how much space for storage there is inside these new refrigerators. When the delivery boy brought my groceries this morning, I didn't see how I could put everything inside, but there is so much room! These containers on the lower shelf are a great help; they not only save space, but the vegetable freshener keeps things crisp for days. Did you notice how nice the lettuce was for the salad? It's the same way with carrots and spinach and green beans, or any other vegetable you buy. When the groceries come, just clean the vegetables, drain them thoroughly, put them inside this freshener, and they are ready to use then, and stay so fresh! The only thing is that you may buy in such quantity at first that you will put too much into the freshener and crush the vegetables. Just be sure you don't do that.

"And the egg basket is something new. In the U. S. Department of Agriculture, they found that eggs 'wilt' if they aren't kept in refrigeration, and this kind of container keeps them from getting crushed. You wouldn't believe it, but it contains two dozen eggs, yet there is ventilation provided. That's the only trouble with keeping them in paper cartons—the paper keeps air from reaching the eggs."

The home service director then pointed out the new position of the tubular light, right over the center freezing unit where it would be most effective and make it easier to see what was inside, and that it helped in cleaning.

"Oh, but I can see this refrigerator will be easy to keep clean," Mrs. Goodrich said.

"Yes, a damp cloth wipes off every spot, and there are no corners or crevices to catch dirt. The simple construction of this refrigerator has a lot of advantages. And, of course, the shelves are removable. Lukewarm water containing a little soda is the best cleansing agent."

Mrs. Goodrich was also interested in the defrosting, for she had heard her friends who had automatic refrigerators talk about that. She asked why defrosting was necessary.

"To get the most efficient use of your refrigerator, you have to defrost it occasionally. Frost forms around the freezing unit and keeps the cold in as a blanket might, requiring more fuel to keep the temperature low. You just turn the knob to the position marked 'defrost', and the rest is automatic; you don't even need to turn it back again. If you keep your foods stored in the right way, you needn't defrost so often. Put almost everything into covered containers, especially butter and leftover foods. Uncooked meat should never be completely covered, but, in general, everything else should be.

"Also, avoid overloading the refrigerator with paper bags and too-large containers and dabs of food that can't be used. That increases the cost of operation. The Servel Electrolux is noted for having the same dependable refrigeration in all parts of the interior because of the complete circulation of air; but when you have shelves overcrowded, the air can't circulate. If you are going to get the most good from your refrigerator, you must use it in the best way."

"When we get our refrigerator," Mrs. Goodrich said eagerly, "for we really will have to have one in time, I wish you would come out and tell me about things like that. I want to keep the best care of it."

After the Goodrichs had gone home, the home service director told Jasper Green what Mrs. Goodrich had said. The next time he dropped in to call on Mrs. Goodrich, he received a welcome reception; and before the month was over, Jasper had smoothed out the problem of payments and had installed a refrigerator in the Goodrich home.

That isn't the end of the story. For after Mrs. Goodrich had her refrigerator, she became a regular attendant at the home service demonstrations, and she found that the home service director could help her in many ways in getting the most from her Servel Electrolux. She told her friends that she didn't see how they managed before they had the refrigerator, and she was glad they hadn't tried to go through the winter without one.

Electrolux 1937 Sales Contest

Plans for the biggest Servel Electrolux refrigerator selling contest in the history of the American Gas Association Refrigeration Committee were adopted by the 1937 Committee at its first meeting held at the Palmer House in Chicago, January 22.

This year's drive will actually last five months instead of three. The intensive period of the contest will be the months of April, May and June, as hitherto, corresponding with the regular Spring and Summer selling season by household refrigerator manufacturers. In March, a "warm-up" campaign will be conducted by the Committee, and a final selling drive in July will be called a "clean-up" campaign, Mr. Henry said.

As 1937 marks the tenth year since Servel Electrolux refrigerators have been on the market, this year's A. G. A. campaign will be known as the "Tenth Anniversary Campaign." The awards to company contestants will have a picturesque and novel character, following the policy of the contests of 1934, 1935, and 1936, when the trophies were, respectively, blue vases, prosperity cups, and swords of merit. This feature of the 1937 contest, along with other details of the campaign, will be announced later.

It is the aim of the present Committee to enlist more than 12,000,000 meters in the campaign, allotted to companies in the special divisions, as in former campaigns. A special section will be devoted to combination companies.

Members of the 1937 Committee are Hall M. Henry, chairman, Ben H. Gardner, of the Gas and Electric Appliance Company, Columbus, Ohio; Albert G. Schroeder, of the Grand Rapids Gas Light Company; Henry Dropp, Milwaukee Gas Light Company; Paul J. Naschold, New Haven Gas Light Company; Clyde Potter, Southern Counties Gas Company; B. O. Brown, Servel, Inc.; J. W. West, Jr., secretary of the Commercial Section, American Gas Association, is also secretary of the Refrigeration Committee.

A New MAGIC CHEF FRY TOP

TO MEET PRESENT DAY REQUIREMENTS OF PERFORMANCE AND ECONOMY...

● Now gas Fry Tops with even heat distribution all over the top plates are ready for the Food Service Industry. These Fry Tops are available with top heat controls which by simply setting a dial will control desired temperatures.

The unit illustrated has two separate fry top sections. Each of these can be operated independently with a different temperature for each section. Or the two can be operated as one large area for frying. In either case the heat is evenly distributed over the whole fry section and is held accurately to the temperature desired. This eliminates guesswork, watching or shifting around to get the right heat. No more fry top zones which are too hot or not hot enough—no more meats partly overdone and partly underdone.

Magic Chef metal alloy fry top plates with raised coved edges store up heat. The entire top may be loaded and reloaded with cold steaks without effecting an excessive temperature drop.

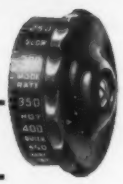
This new Fry Top provides extra large capacity because the entire top surface from side to side and from grease trough to back is usable for broiling or frying with uniform heat.

Other features include automatic lighting, even heat high speed burners, burner radiants to store and radiate heat to fry top, Lorain Oven Heat Control, heavy oven insulation, porcelain enamel oven linings, long life oven-door counter balance springs, sanitary oven bottom.

Investigate this Fry Top unit for efficiency and economy. Write for details.

Magic Chef
AMERICAN STOVE COMPANY

Where gas main service is not available, Pyrofax tank gas service may be obtained anywhere east of the Rockies.



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MAGIC CHEF HEAVY DUTY *Automatic Equipment* FOR MODERN GAS COOKING

Economic Problem of the Small Gas Companies

Walter C. Slade

Gas Engineer, New England Power Service Company

ALL gas companies have in general the same kind of economic problems. In the small companies these problems simply become intensified and the solutions of them become more difficult and decidedly more vexing. Sometimes some of the problems become incapable of solution and then the result is serious. It is still fresh in our minds that only two years ago here in Massachusetts two of the smallest gas companies were forced by economic pressure to go out of business, and a third very small company was kept in operation when absorbed by a larger nearby gas company. All gas companies, both large and small, have the same kind of competition, but not the same degree of competition. The small companies are harassed the more, simply because if they manufacture gas, the holder cost, and if they buy gas, the cost of purchased gas, cannot be brought down to the levels of the holder costs of the large companies. They cannot equally well compete with other fuels. Again, frequently the physical property of the small company is not in as good condition as that of the large company, for a very good reason; and lower operating costs are possible only as the system is more efficient, both as to condition and as to operation. The small company too must spread the personnel out very thinly to operate and maintain its plant and to sell gas and gas appliances up to the volume necessary to stay in business year after year. Some employees must be "jacks-of-all trades," as the gross earnings will not support the sales force of specialists so effectively used, to sell and keep sold modern automatic appliances and special equipment, by the large company. Credit is due the personnel of the average small company for the ability to assimilate the complexities of the changing conditions as they continually appear. Credit is due the individual who can jump from one kind of job to another, and do all jobs with acceptable adaptability.

The unsatisfactory condition of a few of the small gas companies is not to be blamed entirely on happenings during the last five eventful years; depression losses, increased payrolls from more employees working shorter hours, and increased competition from electricity and other fuels selling at lower price levels. It may be blamed in part to a long existing condition which, though always one to be reckoned with, has not persistently presented itself for the actual reckoning until recent years, particularly years since the beginning of the late business depression. This condition, which is explained by a bit of historical review, is one which makes difficult and often impossible the introduction of improvement in plant equipment and in methods of operation, the consummation of which would have immediate, salutary effect on net earnings and would so help to offset the harmful effect of the new operating burdens. Let us look briefly into the circumstances.

Mr. Slade not only analyses the problems encountered by small gas companies but makes constructive suggestions as to how some of these can be solved.—Ed.

The majority of the small gas companies began operation when the coal gas industry went through the promotional stage in this country. In the enthusiasm of the period of development what town of any importance did not want to have its own piped coal gas? A large number of small independent plants began operating and distribution systems were extended liberally. Perhaps some systems were installed which even in the early years of the industry were not highly profitable business enterprises. Manufacturing facilities and distribution systems were probably sometimes overextended in providing for an optimistic future. At least, this must seem so to those now charged with the operation of some of the old plants and distribution systems scattered throughout the eastern part of this country. When water gas came along, most of the small coal gas operators found that because of the increasing cost of labor in the very small coal gas plant, it was more profitable to switch to the manufacture of water gas; and some new companies were started, utilizing effectively the new method of manufacture. Almost all the remaining small companies now buying from the larger companies originally ran coal gas or water gas plants themselves. Such a thorough job of main laying was done during the early years of operation of these small systems that there has not been much expansion since. In two ways at least this is unfortunate. In some instances territory was served which is now not sufficiently profitable to justify continuance but which cannot be easily abandoned; and in all cases a modern distribution system with pipe joints that will not leak and with good services and service connections that will stay tight cannot be substituted for the original comprehensive system built according to the old standards of construction. The very old distribution system must still be maintained, but fortunately there are now effective means of doing this. Some of these small companies that still manufacture gas—and it is almost universally water gas—are in some cases still using very old structures and manufacturing equipment that has seen a good many years of service. Modernization in the past was not considered possible because of limited

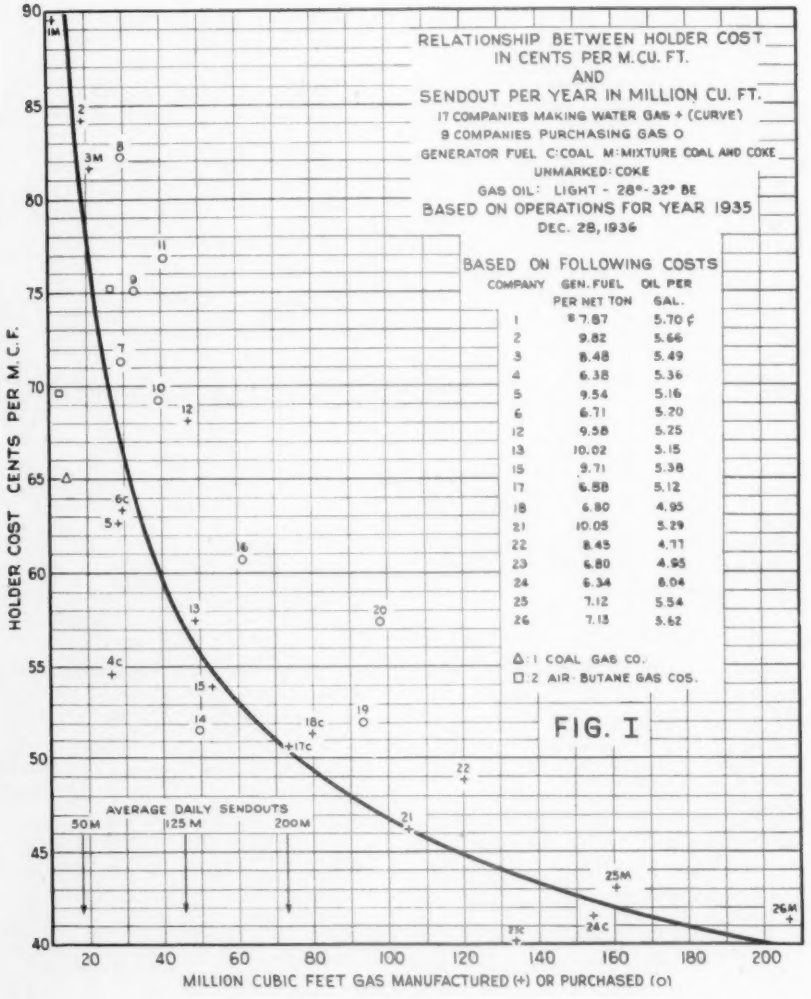

RELATIONSHIP BETWEEN HOLDER COST IN CENTS PER M.CU. FT. AND SENDOUT PER YEAR IN MILLION CU. FT.
17 COMPANIES MAKING WATER GAS + (CURVE)
9 COMPANIES PURCHASING GAS O
GENERATOR FUEL C: COAL M: MIXTURE COAL AND COKE
UNMARKED: COKE
GAS OIL: LIGHT - 28°-32° BE
BASED ON OPERATIONS FOR YEAR 1935
DEC. 28, 1936
BASED ON FOLLOWING COSTS
COMPANY GEN. FUEL PER NET TON OIL PER GAL.
1 $7.87 5.70 ¢
2 9.82 5.66
3 8.48 5.49
4 6.38 5.36
5 9.54 5.16
6 6.71 5.20
12 9.58 5.25
13 10.02 5.15
15 9.71 5.38
17 6.58 5.12
18 6.80 4.95
21 10.05 5.29
22 8.45 4.77
23 6.80 4.95
24 6.34 8.04
25 7.12 5.54
26 7.13 5.62
△: 1 COAL GAS CO.
□: 2 AIR-BUTANE GAS COS.
AVERAGE DAILY SENDOUTS
50M
125 M
200M
HOLDER COST CENTS PER M.C.F.
MILLION CUBIC FEET GAS MANUFACTURED (+) OR PURCHASED (o)

FIG. I

earnings; it is all but impossible under existing conditions. The cost of modernization too often is excessive because money must be spent not only for the improved equipment, which can earn a satisfactory return on the money required for it alone, but also for a number of other changes and improvements which are needed to make possible its use. And the total expenditure cannot be justified as measured by adequate return. If modernization is ever needed, it is needed now to meet with lower manufacturing costs the lower net earnings which must be expected under the changed conditions without a proportionate increase in gross earnings.

Before proceeding further with this discussion it may be well to try to define what is meant by the word "small" in the title of this paper. For reasons which will appear shortly, particular attention will be given to companies which have a sendout of not over 100,000,000 cu. ft. a year, equal to 275,000 cu. ft. a day. We shall consider particularly those smaller companies which send out on the average not over 125,000 cu. ft. a day. These companies are all located in New England and subject to the economic conditions and prices prevailing there.

Let us see what in a general way was the financial showing of a group of 13 of these small companies (with sendouts under 275,000 cu. ft. per day) revealed by information available to the public in the Massachusetts Department of Public Utilities for the year 1935. We cannot unfortunately evaluate the showing for 1936, since the information will not be available until the middle of next March. This group contains five manufacturers and eight distributors. One other company is purposely omitted because it was able to show a net corporate income which was much more than that which any of those operating at profit in the group of 13 could themselves show. This company apparently was able to do so because of its ability to buy gas at a favorably low rate. Five companies were in the red, totalling $42,461 and 8 companies in the black, totalling $28,459, making a composite showing of $14,002 in the red. It should be stated that 3 of the smaller companies in the group were responsible for $38,014 of the total $42,461 reported as losses.

Whatever value may be carried over to profit and loss is determined in part by the amount that it is found prudent to charge to depreciation. When maintenance charges run high, or other expenses are at the time abnormally high, depreciation charges are sometimes reduced, provided the depreciation reserve at the time is adequate. That the managements of many of these companies are acting with conservatism and with sound business judgment is evidenced by the fact that liberal amounts are being charged to depreciation reserve even though reduced net earnings result therefrom. Were depreciation taken in each case such as to equal when added to actual maintenance expense 12½% of the value of total gas sales, then on this basis the showing of the group would appear substantially better. In one instance however 12½% would not cover actual maintenance.

	Net Corporate Income Based on Charges to Depreciation and Maintenance	
	As Recorded	12½% Total Sales
5 Companies	$42,461 loss	$26,806 loss
8 Companies	28,459 gain	74,332 gain
13 Companies	$14,002 loss	$47,526 gain
10 Companies (of the 13)	24,012 gain	71,515 gain

These figures include gas operations of 5 "combination" companies. In the main, but not in all instances, this unsatisfactory condition comes about as a result of too small a volume of gas sales, which means inadequate gross earnings, and too high a cost for gas, be it manufactured or purchased.

Holder Costs

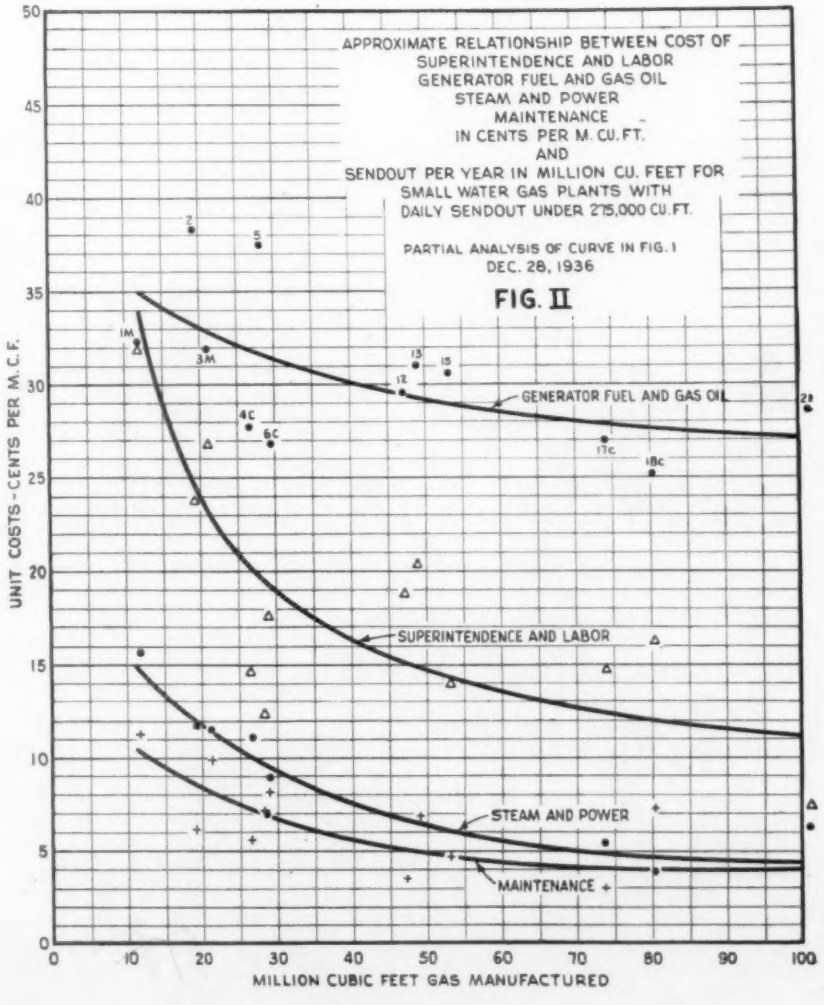
Let us now look a bit at holder cost and see how it is influenced by change in magnitude of send-out for a manufacturing company. Again, the D.P.U. operating reports for the year 1935 are used, together with other data which has been made available to the writer. In Fig. I a graph is shown which is determined from the positions of holder costs in cents per M.C.F. against corresponding annual quantities of gas manufactured in millions of cubic

feet, for 15 companies making only water gas and using only 28°-32° Be' gas oil in the operation. All costs are on the basis of gas of the Massachusetts standard of 528 B.t.u. per cu. ft., adjustments having been made for costs of companies manufacturing to meet other standards. In order to locate with reasonable approximation the upper extremity of the graph, the net production costs of Companies 1 and 2 (which ceased operations near the close of 1934) were taken as reported for the year 1933 and increased to adjust for the higher fuel and gas oil prices which prevailed during 1935. It is likely, however, that with the shorter hours recently effective, the increased labor costs would have boosted the two holder costs shown on the graph at least up to points between 90c and $1.00 per M.C.F. These higher values would not change radically the locus of the graph. The holder cost of Company 3 was decreased to reflect operating efficiencies which have been obtained in 1936 and which were possible of attainment in 1935, with the same supervision applied. The holder costs of Companies 15 and 18 were reduced to adjust for abnormally high maintenance expense which was extraordinary or non-recurring, and the holder cost of Company 23 was increased to compensate for a non-recurring operating credit.

It is likely that some similar adjustments would be equally proper in other cases, but the writer has not available sufficiently complete information to determine this. No attempt has been made to compensate for differences in costs of generator fuel and of gas oil, or of labor. The costs of maintenance reserves for the year have been included in costs of 11 of the manufacturing plants. The other 7 may or may not follow this practice. Taking the normal running costs as they appear, an interesting fact is developed as a result. The companies that were making less than 275,000 cu. ft. a day and have the lowest holder costs were using coal (which is cheaper than coke) for generator fuel; and the companies that were making more than 275,000 cu. ft. a day and had the lower holder costs also were using coal while the others were using coke or a mixture of coal and coke.

The graph is intended only to present an idea which can be visualized by its use much easier than by other means. Should the costs for twice as many plants be plotted, the graph would obviously shift position and become somewhat more accurate as an indication of general relationship between holder cost and average daily make. But the *form* of the graph would be the same. It would show as this one does that holder costs rise with ever growing rate of increase as the daily makes decline by moderate decrements.

The company making only 50,000 to 100,000 cu. ft. of gas a day finds it difficult to stabilize its holder cost. The unit cost may vary considerably from time to time as the dollar values of labor and materials vary by seemingly small amounts. Accordingly, there must be greater spread for adequate protection between holder unit cost of gas and the minimum cost at which gas can be sold under industrial or promotional rates, than is needed by the larger companies. This means it is just so much more difficult to sell gas. From the opposite point of view, such an operating company has opportunity to make relatively great improvement in unit holder cost (and of course net production cost) by staying in the fight for existence and reducing operating expenses to the very minimum possible. The personnel of such a company must understand that everyone's job depends on making the fight successful, and all employees must cooperate among themselves and with the management for the common good of employees and company. The management of such a company must be willing to make the fight and be prepared to make some capital expenditures when the money required is within the capacity of the management to expend, and the economic effect on the operating expense of the company is absolutely certain to be reflected in an adequate reduction. If this sort of effort will not suffice, then the management must abandon manufacture and buy gas, if it is at all possible to do this, or eventually go out of business. It will, indeed, be unfortunate if the increase in the payroll expense of some of these small companies which has occurred at a time when increased operating costs are so damaging to their security, and which has been caused in the effort to allow employees to en-



joy shorter working hours each week and to provide more jobs in common with the general movement throughout the country, should after all result in serious harm to the employees by actually depriving some of them of their jobs completely. The importance that cost of labor holds in these small companies is indicated on Fig. II, which will be discussed shortly.

The graph in Fig. I also shows clearly that any manufacturing company now having an annual sendout of from 80,000 M.C.F. to 100,000 M.C.F. or thereabout and exhibiting costs of the order shown cannot allow its volume of sales to decline, for below 80,000 M.C.F. the production cost per unit of manufacture begins to follow the path of the skyrocket, and such a company certainly should not delay any capital improvements which will assure immediately a proportionate return on the investment. It should be emphasized that the point of danger is is subject to shift with entirely different companies or with more companies added. Operating personnel should also be reduced to the practical minimum. All before the situation becomes acute. In making these statements the writer does not want his audience to believe that he himself thinks that managements are not alert and cognizant of the conditions now prevailing. He is simply trying to concentrate attention on these conditions, hoping that from the combined efforts of all of us we may be able to find solutions of these pressing problems.

Let us now refer to Fig. II which attempts to give a partial analysis of that part of the unit holder cost shown by the graph in Fig. I for annual productions less than 100,000 M.C.F. Again, it is emphasized that the loci of the four graphs are subject to change were data of other or additional companies used, but the general trends shown by the form of the graphs would remain the same. It is seen at once that the rapid increase in holder cost below, let us say, 125,000 cu. ft. daily make is caused by the disproportionate increase in cost of labor and superintendence. This is because superintendence expense is more or less a constant, and in case of labor there finally comes a time when the minimum number of employees required to operate the plant at any rate of diminishing production has been reached. The other graphs rise with decreasing make (though less precipitously) because the gas making materials generally cost a little more than, and are not used so efficiently as, in case of the larger manufacturing plants. Also, there is often a larger amount of stand-by loss and stand-by time, so much so that occasionally it is possible to manufacture gas every other day and thereby save money by using less of the raw materials. Maintenance expense increases because labor is a component part, and even moderate expenditures in dollars produce increasingly great effect on the unit cost of maintenance. Also equipment is often maintained for longer periods than in the larger plants where money can be more readily spent for replacements, and this means increasingly greater maintenance expense for the smaller plant as time goes on.

Purchased Gas

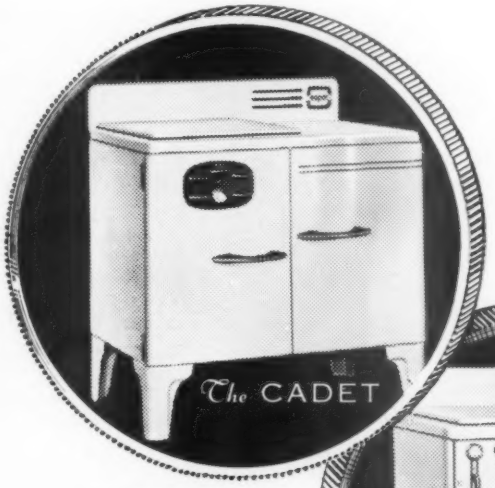
Now that we have spent considerable time talking about the small manufacturing companies, let us just glance at some of the average costs of purchased gas for equally small distribution companies in the year 1935. Obviously, no graphic representation is really justified because generally each cost figure represents the result of some negotiation between the seller and purchaser which was written into a contract at some previous time and is now applied to sendout conditions of the present. Even so, the average costs of gas per M.C.F. purchased for all of 9 distribution companies have been located in Fig. I, using the same coordinates and scales that are used for the manufacturers. The points with two exceptions line up in surprising fashion. A graph could readily be drawn among seven of the points and it would lie more or less parallel to and above the graph of unit holder costs of the manufacturers. It appears that the price at which gas was purchased is with one exception well above the graph of varying unit holder costs of the manufacturers. The five smallest companies of the purchasing group bought gas at prices varying from about 69c per M.C.F. up to about 83c per M.C.F., a spread of 14c. Yet the volume of gas purchased varied between the narrow limits of about 30 M.C.F. and about 40 M.C.F.

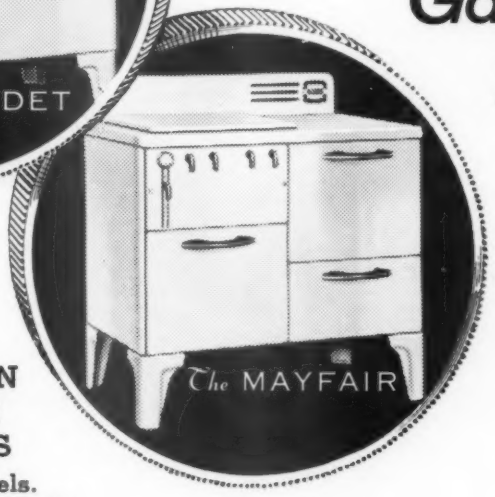
One wonders how any small gas company buying gas at rates within the range indicated can do much of a business with industrial and with building heating customers. It is this kind of business that gas companies must depend upon to build up sales volume, even though the profit may have to depend on narrow margins. It is certainly in the interest of the company selling gas for the company buying gas to retain what sales it has at present and, if at all possible, increase its sales. If the customer goes out of business on account of continuing financial loss, then the selling company will suffer immediately from sudden loss of a large block of gas, and its own manufacturing costs per unit sold will correspondingly increase. As a business proposition, pure and simple, it may be well for the larger gas companies to consider this mutuality phase of their contracts with the small distribution companies, and offer such reduced rates to their customers as may be reasonable and possible before the sales of these small companies have declined to points where relief, if finally given, will do comparatively little good. The writer realizes fully that such action would mean immediate reduced profits for the seller; but will not the average large gas company go a very long way to hold the business of a large industrial customer against proven competition? And why should not the same company in self interest aid in holding the business of its customer gas company against the ever increasing competition of electricity and of other fuels? From another point of view, how can some of the very small gas companies now manufacturing gas turn to purchased gas as a means of escape should the economic pressure become unburdenable, unless some way is found to write a contract that will provide gas at a price and on a rate which will permit the small companies to continue serving the communities which they have served faithfully and well for so many years?

The solution of the difficulty is not alone a substantial reduction of the price of gas by the larger company. The obligation is bilateral. The smaller company should immediately take advantage of the reduction to increase the volume of its own sales, both by energetic effort and by revision of its own rates for the purpose of load building. The smaller company must make the sacrifice of the larger company as unburdenable as possible by increasing through its own larger sales the volume of its purchased gas. Perhaps there is a fair way in which the spirit and even the method of such an arrangement may be expressed in a contract.

Certainly air-butane gas is not the solution for reduced production costs, because it must be distributed through very old distribution systems and anyone who has looked into the history of such substitutions knows

(Continued on page 45)





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with these

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Also many other models.
See this complete line—NOW!

America's finest

GAS RANGE

for more than 52 years

Let us show you these ROPER features:

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- Giant High-Speed Burner
- Low Temperature Oven Burner
- "Lifetime" Cooking Chart
- "Air-stream" Cooking Top
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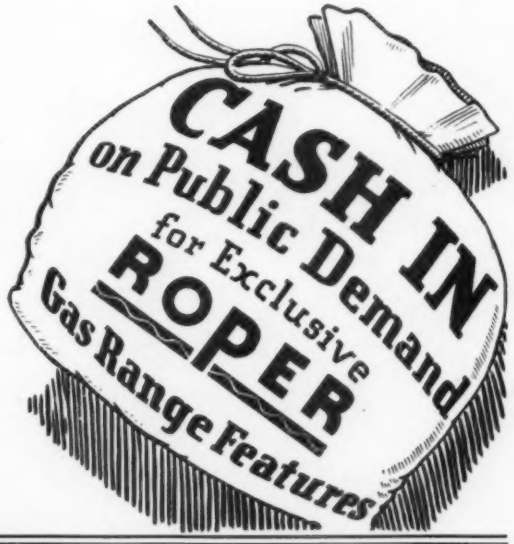
ROPERS, of course, have all of the other improvements, in addition to those which are ROPER'S own.

When your customers ask to see a modern gas range—show them a ROPER, produced by America's finest gas range manufacturer for more than 52 years.



Roper Ranges are ideal for use with all kinds of gas, including bottled gas

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FOUND! Thousands of New Prospects for Gas Water Heating . . . with the

AMERICAN-BOSCH No-Tank WATER HEATER

• FOR THE HOME

Small homes, summer cottages, "cold-water" houses and apartments will bless the American-Bosch No-Tank Water Heater . . . and the *low-cost* hot water it makes possible.

• FOR BARBER SHOPS

The capacity of the American-Bosch No-Tank Water Heater is ample even for the requirements of busy barber shops.

• FOR BEAUTY SHOPS

Two outlets can be supplied, if desired, from the same "No-Tank" Heater . . . a feature of special value to beauty shops.

• FOR FILLING STATIONS

Customers using the rest rooms appreciate the extra courtesy of hot water. It helps keep attendants looking clean, besides.

• ALSO:

For doctors' and dentists' offices . . . business offices . . . drug store fountains . . . domestic science classes . . . laboratories . . . anywhere and everywhere that hot water is needed . . . AT A PRICE.

The American-Bosch No-Tank Water Heater is 23¼" high, 6¼" in diameter. Gleaming white enamel finish or chrome plated fixtures harmonize with any modern kitchen. Heater has hot and cold water faucets so that temperature of water can be adjusted. A second outlet (such as in bathroom) can be provided at slight additional cost.

WHEN you can promise hot water at the turn of a faucet...without expensive equipment in the cellar ...without a tank in the kitchen...and at modest first cost, installation and upkeep...*you've got something*—

—something that extends the benefits of automatic hot water to additional thousands in your community.

—something that opens up hitherto closed markets among simpler homes and apartments, and smaller commercial installations.

—something that will prove a permanently effective load builder.

The new American-Bosch No-Tank Water Heater heats water instantaneously, automatically at the turn of the faucet... ¾ of a gallon per minute. No waiting...no waste.

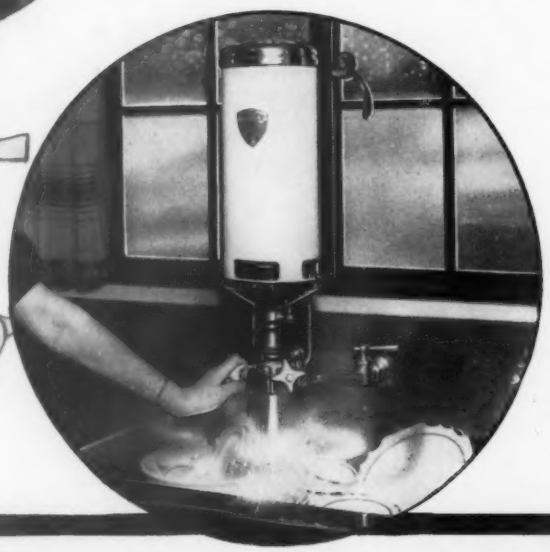
And installation is extremely simple, it being only necessary to attach the heater in place of the cold water faucet and connect the gas line!

The American-Bosch No-Tank Water Heater, along with the American-Bosch Konverto, Kabinette and Ball-Tank Water Heaters, gives gas companies a complete, practical, profitable line to meet almost every domestic water heating need. Write for complete information and literature.

Gas Appliance Division

UNITED AMERICAN BOSCH CORPORATION

SPRINGFIELD, MASS. New York Chicago Boston Pittsburgh



The makers of American-Bosch products have always taken pride in creating, designing, building and selling products superior to those commonly in use. Built to a high standard of quality, these products are proven leaders in their fields.

(Continued from page 42)

that there is increased distribution expense and considerable trouble to be expected with increased unaccounted-for gas, fogging and odorizing operations, replacement of many services, much attention to customers appliances, etc. While the battle may be won in the end, the total cost of the victory cannot be safely forecasted. The writer has certainly been frank in expressing his thoughts in this paragraph, and he hopes that some of his friends who may read it will still remain his friends.

Reducing Production Costs

Now what are we going to do about trying to reduce the production costs of the small water gas company that must continue to manufacture gas?

We will consider that gas is being made with the light gas oil which is still generally used in these small plants. If the gas machine has a back run and coke is being used in it, it seems logical to change to a good grade of well cleaned, sized gas coal to take advantage of the lower price of coal and of the larger yield of tar which can be used for fuel under the boiler. If the machine happens to be of the older "split-run" variety, it is still possible to use a certain amount of coal along with the coke. The success with which this has been done for several years in two plants having small split-run water gas machines is shown by the following figures:

	Per cent of Coal	
	4 ft. set	*5 ft. set*
1932	38.0	36.2
1933	43.0	35.4
1934 .....Plant		32.1
1935 .....shut		29.8
1936 (9 mos.) .....down		32.1

If, however, a moderate capital investment may be made, a back-run should be installed and then only coal used as a generator fuel. This is now being done in the plant with the 5 ft. set, advantage being taken of the fact that maintenance had to be charged with some $600 for replacement of hot-valves. With the capital expenditure for the back-run made, operating economies will immediately follow.

The cost of boiler fuel may be reduced by using as much as possible of yard screenings from local coal dealers, or from dealers in near-by towns, to supplement the fines that accumulate from handling the gas coal and the water gas tar recovered in the plant. A minimum of bituminous steam coal should be used. Screenings may be purchased at prices varying from $1.50 to $2.50 a ton delivered. The following examples show how this worked out in two plants using only coal for generator fuel during 1935:

	I Pounds	II Pounds
Bituminous coal	375,797	510,182
Gas coal screenings ..	47,967	262,913
Anthracite screenings	438,177	210,502
Tar (solid fuel equivalent)	332,060	516,374
Total	1,194,001	1,499,971

If the plant is too small to support the capital cost of a change-over from light to heavy gas oil, but if the plant location is such as to make the use of heavy oil otherwise feasible, a scheme which has been called to the writer's attention might be tried, since it is working successfully in one plant. This plant has a back-run machine and uses coke for generator fuel. It was found possible to mix in equal proportions a residuum gas oil and a light gas oil under favorable temperature conditions so that the mixture can be handled in the winter weather without the use of any heaters or other special equipment. The mixture can be gassified in the carbureter as easily as the light oil, and with fair efficiency.

Since cost of labor generally determines in part the cost of maintenance, and labor is relatively high in the small plant, it will be economical to buy good materials for maintenance work. Reference is made to such things as refractories for generator linings, to checkerbrick, and to such materials as door liners, lintels, etc. If the plant cannot afford the first cost of a silicon carbide generator lining, it surely can afford to use some one of the better grades of fire clay refractories now available which are so processed as to produce a certain amount of so-called mullite within the structure of the refractory material. The cost of these special refractories is so little more than the cost of a first quality standard firebrick that one is justified in using them when the additional life of the refractory in service is taken into question. Again, the additional service that may be obtained from iron castings made of iron alloyed with small amounts of chromium or chromium and nickel seems to justify the use of such material, for again the cost is only moderately above that of ordinary cast iron.

Purification Costs

The cost of purification sometimes runs unduly high in some small plants because of insufficient scrubbing and cooling of the raw gas. Considerable tar fog over a time passes into the purifier boxes and is responsible for premature changes of the sponge in the boxes. This is a condition which should be watched unless means are now available for eliminating the trouble and excessive purification expense at moderate cost. The new type of liquid scrubber which was described at a recent meeting of this division appears to be coming rapidly into favor and should aid materially in solving such purification problems. Fortunately for the small company the cost of the equipment is reasonable.

Labor Costs

How to reduce expenses of labor is always a vexing problem. If the small plant is unable to operate with equal success with fewer employees on the payroll it can at least utilize the services of its employees to maximum advantage. There can be no sharp line of separation drawn between production and distribution operations. The personnel of the very small company must be versatile. The spare gas maker may be normally employed in distribution work and a utility man normally working in the plant may be called on to help in the distribution department on occasion. The production and distribution personnel must in effect be composed of a group of utility men and be expected to take care of the normal operation and ordinary running maintenance. Abnormal conditions such as the change of a purifier box or the patching of the shell of a water gas machine will generally have to be taken care of by the employment of temporary labor or by contract.

If a small company happens to have sufficient storage holder capacity to enable it to omit manufacturing operations on one or more days of a week it will then he possible for the working time of the employees to be so scheduled as to give certain men days off on the particular days when gas is not manufactured. This will make it possible to conform to the shorter working week idea without increasing materially the plant pay-roll under the conditions cited. Such a procedure was followed effectively by one company of which the writer has knowledge.

Several of the small gas companies

FORM B. C. 600-1
RM-11-36

COMPANY

DAILY OPERATING REPORT—WATER GAS

DATE _____ 193

GAS MANUFACTURED OR PURCHASED

STATEMENT OF STATION METER TODAY		
STATEMENT OF STATION METER YESTERDAY		
DIFFERENCE		
FACTOR		
GAS REGISTERED, UNCORRECTED		CU. FT.
SLIPPAGE CORRECTION, MINUS		CU. FT.
SLIPPAGE CORRECTION, PLUS		CU. FT.
GAS REGISTERED, UNCORRECTED		CU. FT.
TEMPERATURE	°F	
BAROMETER	"HG.	
PRESSURE	"HG.	
TOTAL PRESSURE	"HG.	
CORRECTION FACTOR		
GAS REGISTERED, CORRECTED		CU. FT.
RELIEF HOLDER TODAY	CU. FT.	
RELIEF HOLDER YESTERDAY	CU. FT.	
LOSS OR GAIN		CU. FT.
TOTAL GAS MADE OR PURCHASED		CU. FT.
STORAGE HOLDER NO. 1	CU. FT.	
STORAGE HOLDER NO. 2	CU. FT.	
STORAGE HOLDER NO. 3	CU. FT.	
TOTAL ON HAND TODAY	CU. FT.	
TOTAL ON HAND YESTERDAY	CU. FT.	
LOSS OR GAIN		CU. FT.
GAS SENT OUT		CU. FT.

TIME	CITY GAS B. T. U. TESTS		BAROMETER	OUTSIDE
	OFFICE	PLANT	"HG.	TEMPERATURE
AVERAGE				

GENERAL WEATHER CONDITION

GENERATOR LINING—HOURS TO DATE	(1)	(2)	
CARBURETTER CHECKERS—HOURS TO DATE	(1)	(2)	
SUPERHEATER CHECKERS—HOURS TO DATE	(1)	(2)	
STEAM PURCHASED	LBS. SOLD		LBS.
ELECTRICITY PURCHASED FOR POWER			K.W.H.
ELECTRICITY PURCHASED FOR LIGHTING			K.W.H.

NOTE 1. USE FORMULA $\frac{B \cdot 300}{A} + 81 = $ B. T. U. PER GAL.

(WHERE B EQUALS AVERAGE B.T.U., A EQUALS AVERAGE GALS. OIL PER M.)

NOTE 2. START WITH FIRST BLOW AND INCLUDE ALL BLOWING, RUNNING AND COALING TIME.

NOTE 3. USE A FACTOR OF 10 LBS. PER GAL. FOR UNDEHYDRATED TAR AND A FACTOR OF 12 LBS. PER GAL. FOR TAR DEHYDRATED IN A DE-EMULSIFIER OR IN A CENTRIFUGAL SEPARATOR OR FOR FUEL OIL, UNLESS PLANT DATA IS AVAILABLE TO SUPPORT A DIFFERENT FACTOR WHICH MAY BE USED.

NOTE 4. SPACE FOR STATING KIND OF COAL, COKE AND OIL USED; WORK DONE ON SET, RELINING, CHECKERING, ETC.; OPERATING TROUBLES AND CAUSES; UNUSUAL CONDITIONS AFFECTING OPERATING RESULTS; ANY SPECIAL DATA OR INFORMATION.

WATER GAS SET RESULTS

SET OPERATED TODAY			No.	
COKE USED	KIND		LBS.	LBS./M
COAL USED	KIND		LBS.	LBS./M
TOTAL—GROSS			LBS.	LBS./M
COKE FROM CLINKERS SENT TO BOILERS			LBS.	LBS./M
TOTAL — NET			LBS.	LBS./M
COAL IN GROSS GENERATOR FUEL				%
OIL USED	KIND		GALS.	GALS./M
OIL EFFICIENCY (NOTE 1)				BTU/GAL.
TOTAL RUNNING TIME (NOTE 2)				HOURS
TOTAL STANDBY TIME DURING RUNNING PERIOD				HOURS
TOTAL RUNS MADE	TOTAL CLEANING TIME			HOURS
AVERAGE MAKE PER RUN				CU. FT.
AVERAGE MAKE PER HOUR RUNNING TIME				CU. FT.
AVERAGE MAKE PER MINUTE OF RUN PER SQ. FT. GRATE AREA				CU. FT.

CYCLE, STEAM, WATER, AIR, TEMPERATURE USED TODAY

SUPERHEATER PYROMETER SETTING	°TOP	°BOTTOM
AIR PRESSURE UNDER GRATE	INCHES WATER COLUMN	
GENERATOR AIR PER MINUTE		CU. FT.
UP-RUN STEAM PER MINUTE		LBS.
BACK (OR DOWN)-RUN STEAM PER MINUTE		LBS.
BACK-RUN WATER PER MINUTE		LBS.
TOTAL STEAM AND WATER PER RUN		LBS.
TOTAL STEAM AND WATER PER M. CU. FT. GAS		LBS.

CYCLE	MIN.	SEC.		%
BLOW				
BLOW-RUN				
UP-RUN				
BACK (OR DOWN)-RUN				
FINAL UP-RUN				
AIR PURGE				
TOTAL CYCLE				100

BOILER PLANT RESULTS

BITUMINOUS COAL		LBS.	LBS./M
GAS COAL SCREENINGS		LBS.	LBS./M
ANTHRACITE SCREENINGS		LBS.	LBS./M
COKE BREEZE		LBS.	LBS./M
GENERATOR COKE FROM CLINKERS		LBS.	LBS./M
TOTAL SOLID FUEL		LBS.	LBS./M
TAR	GALS.		
TAR @	LBS. COAL/GAL.—NOTE 3	LBS.	LBS./M
FUEL OIL	GALS.		
FUEL OIL @	LBS. COAL/GAL.—NOTE 3	LBS.	LBS./M
TOTAL BOILER FUEL—COAL EQUIV.		LBS.	LBS./M
FEED WATER METER TODAY			
FEED WATER METER YESTERDAY			
FEED WATER USED		LBS.	LBS./M
STEAM CONSUMED		LBS.	LBS./M
EVAPORATION		LBS. WATER/LB. FUEL	
AVG. FEED WATER TEMPERATURE	°F	COMPOUND USED	
AVG. STEAM PRESSURE	LBS./SQ. IN.		

REMARKS (NOTE 4):

SIGNED

TITLE

FORM 600-2
RM-4-36

COMPANY

WEEKLY COMPARATIVE OPERATING REPORT—WATER GAS

WEEK ENDING SATURDAY _____ A. M. _____ 193_

ITEM		THIS YEAR	LAST YEAR	INCR. OR DECR.	PERCENT
GAS MANUFACTURED	CU. FT.				
GAS PURCHASED	CU. FT.				
MAXIMUM DAILY SEND OUT	CU. FT.				
MAXIMUM DAILY SEND OUT	DATE				
MINIMUM DAILY SEND OUT	CU. FT.				
MINIMUM DAILY SEND OUT	DATE				
AVERAGE DAILY SEND OUT	CU. FT.				
AVERAGE HEAT VALUE PER CU. FT. OF GAS AT WORKS	B.T.U.				
AVERAGE HEAT VALUE PER CU. FT. OF GAS AT OFFICE	B.T.U.				
LAST HEAT VALUE PER CU. FT. OF GAS BY STATE TEST AND DATE	B.T.U.				
WATER GAS SET RESULTS					
NUMBER AND SIZE SETS OPERATED					
GENERATOR FUEL PER M—COKE	LBS.				
GENERATOR FUEL PER M—COAL	LBS.				
GENERATOR FUEL PER M—TOTAL	LBS.				
GENERATOR FUEL PER M—NET (CINDERS DEDUCTED)	LBS.				
GAS COAL IN TOTAL GROSS GENERATOR FUEL	%				
OIL PER M	GALS.				
OIL EFFICIENCY (NOTE 1)	B.T.U.				
AVERAGE RUNNING TIME PER DAY (NOTE 2)	HRS.				
AVERAGE NUMBER OF RUNS PER DAY					
AVERAGE MAKE PER RUN	CU. FT.				
AVERAGE MAKE PER HOUR OF RUNNING TIME (NOTE 2)	CU. FT.				
AVERAGE MAKE PER MINUTE OF RUN PER SQ. FT. GRATE AREA	CU. FT.				
BOILER PLANT RESULTS					
BITUMINOUS COAL PER M.	LBS.				
GAS COAL SCREENINGS PER M.	LBS.				
ANTHRACITE SCREENINGS PER M.	LBS.				
COKE BREEZE PER M.	LBS.				
COKE FROM GENERATOR CLINKERS	LBS.				
TOTAL SOLID FUEL PER M.	LBS.				
TAR PER M.: EQUIVALENT SOLID FUEL AT ____ LBS. COAL/GAL. (NOTE 3)	LBS.				
FUEL OIL PER M.: EQUIVALENT SOLID FUEL AT ____ LBS. COAL/GAL	LBS.				
TOTAL FUEL PER M—COAL EQUIVALENT	LBS.				
FEED WATER USED PER M.	LBS.				
STEAM CONSUMED PER M.	LBS.				
EVAPORATION	LBS. WATER/LB. FUEL				
GENERATOR LINING—HOURS TO DATE	(1) (2)				
CARBURETTER CHECKERS—HOURS TO DATE	(1) (2)				
SUPERHEATER CHECKERS—HOURS TO DATE	(1) (2)				

Actual Size of these Forms 8½ x 11

NOTE 1. USE FORMULA $\frac{B \cdot 300}{A} + 81 = $ B. T. U. PER GAL.

(WHERE B EQUALS AVERAGE B.T.U., A EQUALS AVERAGE GALS. OIL PER M.)

NOTE 2. START WITH FIRST BLOW AND INCLUDE ALL BLOWING, RUNNING AND COALING TIME.

NOTE 3. USE A FACTOR OF 10 LBS. PER GAL. FOR UNDEHYDRATED TAR AND A FACTOR OF 12 LBS. PER GAL. FOR TAR DEHYDRATED IN A DE-EMULSIFIER OR IN A CENTRIFUGAL SEPARATOR OR FOR FUEL OIL, UNLESS PLANT DATA IS AVAILABLE TO SUPPORT A DIFFERENT FACTOR WHICH MAY BE USED.

NOTE 4. SPACE FOR STATING KIND OF COAL, COKE AND OIL USED; WORK DONE ON SET, RELINING, CHECKERING, ETC.; OPERATING TROUBLES AND CAUSES; UNUSUAL CONDITIONS AFFECTING OPERATING RESULTS; ANY SPECIAL DATA OR INFORMATION; USE REVERSE SIDE ALSO.

NORMAL CYCLE, STEAM WATER AND AIR USED THIS WEEK

SUPERHEATER PYROMETER SETTING	°TOP	°BOTTOM
AIR PRESSURE UNDER GRATE	INCHES WATER COLUMN	
GENERATOR AIR PER MINUTE		CU. FT.
UP-RUN STEAM PER MINUTE		LBS.
BACK (OR DOWN)-RUN STEAM PER MINUTE		LBS.
BACK-RUN WATER PER MINUTE		LBS.
TOTAL STEAM AND WATER PER RUN		LBS.
TOTAL STEAM AND WATER PER M. CU. FT. GAS		LBS.

CYCLE	MIN.	SEC.		%
BLOW				
BLOW-RUN				
UP-RUN				
BACK (OR DOWN)-RUN				
FINAL UP-RUN				
AIR PURGE				
TOTAL CYCLE				100

REMARKS (NOTE 4):

NAME DAYS WHEN GAS WAS NOT MADE

SIGNED

TITLE

operate as combination companies and this makes it possible for the managements to arrange the duties of the employees in such a way that some are able to work at times in the electrical department and at other times in the gas department. This arrangement makes it possible to eliminate all unproductive time from the gas operations without in any way affecting adversely the expense of the electric operations. It may also be pointed out that in a combination company it is frequently possible to so arrange the work to be done that one employee may be able to do work while on duty in both departments in such manner that his time will be completely utilized. Just what may be accomplished in this way is illustrated in Figure 1 by the relative holder costs of companies 4-C and 6-C. The first named is a combination company and the second named is not. It happens that the unit cost of gas making materials plus steam and power was just about equal in 1935 for the two companies. The cost of labor for the combination company was approximately three cents per M.C.F. less and maintenance was about two and three-quarters cents less for the combination company. The reason why maintenance was less is partly explained by the fact that the production plant of the combination company was rebuilt a few years ago at which time a new gas machine was installed. The production plant of the other company has operated for many years without much of any change in equipment.

While the majority of the small gas manufacturers are distributing only low pressure gas and accordingly can lock up the plant at night time, there are a few that are distributing gas under pressure so it generally becomes necessary to have labor at the plant continuously for the purpose of attending boiler plant pumping apparatus. It is not unlikely that one or more of these plants which have to keep going at night to do pumping can make a sufficient saving in the pay-roll to justify an investment in a pressure tank of sufficient size to allow reducing the operating time of the plant to a single shift. Within this shift all the low pressure and high pressure gas requirements for the maximum day send-out would be produced. Such an investment would still possess value if at a later time the company should find it economical to switch from a manufacturing to a distributing company and purchase its gas requirements.

Plant Records

Before leaving the subject of methods for reducing plant production costs, a word should be said regarding the necessity of keeping adequate plant records. It is recognized that the smaller the plant and the smaller the personnel just so much more difficult is it to keep these records in proper form and sufficient detail because the man who must keep the records will have many other duties to perform. However, an attempt should be made to keep complete records. The larger plants have no excuse for not keeping complete records because without them the best efficiencies of operation cannot be attained or maintained. We have placed so much importance upon adequate records that for the last six years all of the water gas plants in the group of companies with which the writer is associated have been required to render weekly statements of operation in addition to the monthly statements. Importance is placed on the weekly statements because it has been found that conditions can change so rapidly in the operation of a small water gas plant that unnecessary money may be wasted for too long a time if it were possible to make a check of operating efficiencies at monthly intervals only. Accordingly, a series of forms have been developed which have proved of great value from the point of view of the writer and may be worth bringing to your attention.

All forms are on a standard letter size sheet to facilitate filing at the local company and at headquarters. These forms which tie in with one another in all respects are as follows:

(Continued on page 68)

Twelve-inch Main Pierces 164-foot Embankment

Forcing a 12-inch welded steel gas main through a 164-foot bore beneath a wide section of Highway Route 29 in New Jersey was accomplished with notable success by Elizabethtown Consolidated Gas Co. of Elizabeth, N. J. in connection with a three and a half mile extension of their distribution system. The bore enabled a saving of 1200 extra feet of main by avoiding a roundabout route, shortened the construction time by a week and effected an estimated saving of $4,000.

The work was accomplished with a Hydrauger ordinarily used to bore under 50 foot streets, the equipment being placed in an excavated pit adjoining the right-of-way. As the boring progressed, the gas main, welded by sections while the work proceeded, followed the bore beneath the 40 foot graded roadway and emerged at the far side within three inches of the objective center. A low geared steel pulley operated by the pipe line gang pushed the main ahead. Some difficulty arose on reaching the 100 foot mark. From this point on a hose connected to the head furnished a stream of water which carried off the excavated material and also served to cool the drill.

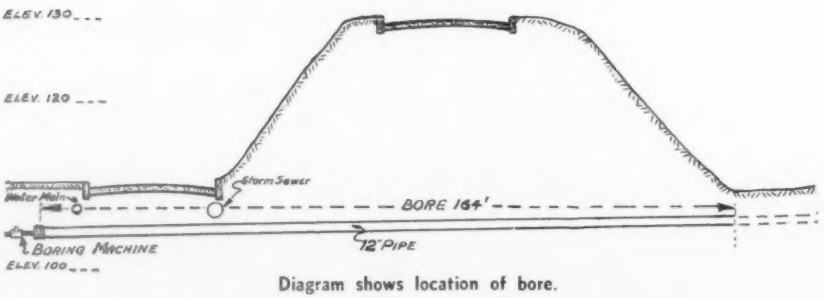
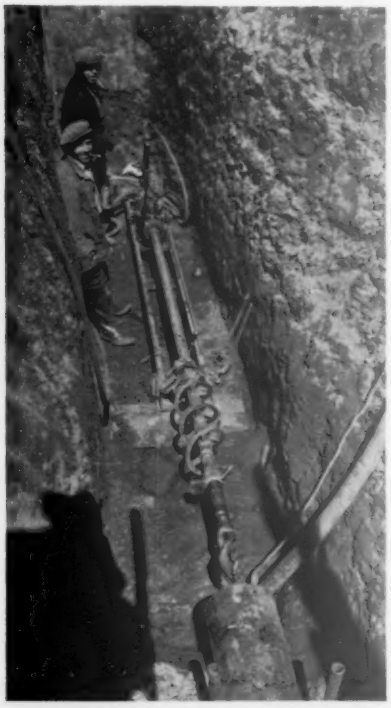


Diagram shows location of bore.

Below: Arrow indicates point of operation.



Boring machine was operated in a pit located beside the right-of-way.

While 25 or more bores of varying lengths up to 123 feet have been made by the Elizabeth Co. since 1925, this is the most noteworthy bore of this type that they have ever made.

The work, which was completed in thirty-three hours, was accomplished under the direction of Dennis J. Manning, engineer of distribution for the Company. The extension to the system including this bore went into operation during October 1935. The accompanying diagram and views illustrate the nature of the bore and the equipment used.

Commercial Cook School to be Held in Boston, Mass.

A Commercial Cooking School will be conducted in Boston for five and one-half days during the week of February 15. It is being conducted under the auspices of a Commercial Cooking School Committee of the Industrial Division of the New England Gas Association.

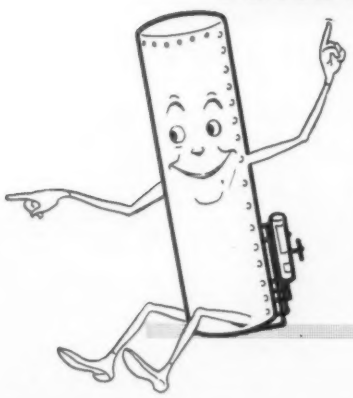
The personnel of the committee is Cecil C. Ogren, of Malden, chairman; W. S. Anderson, of Boston; Roy E. Wright, of Cambridge; Harry King, of Boston; Robert Melvin, of Boston; and George E. Radford, of Boston. The first three are gas company men and the last three are manufacturers.

The subjects covered will be markets, fuels, equipment, kitchen planning, selling and cooking demonstrations. Each subject has many sub-divisions which will be discussed by men of wide experience in the gas industry.

The general purpose of the school is to accomplish for the New England gas industry the same constructive job that was accomplished for the industry by the house-heating school which the Industrial Division gave at M. I. T. last February which was attended by sixty persons.

ON • YOUR • DOORSTEP!

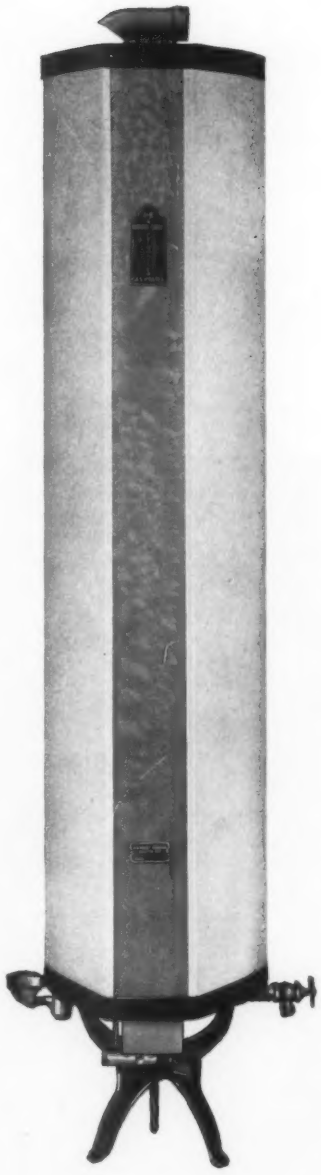
YOUR BEST PROSPECTS FOR IMMEDIATE...INCREASED CONSUMPTION



CONVERT TANKS INTO AUTOMATIC WATER HEATERS

It's all done with

MIRRO-SHELL



MIRRO-SHELL

Completely Assembled

Heating element and insulation combined—one complete unit at low first cost.
Quickly installed by one man.
No liming, sediment or circulating trouble.
24-gauge steel jacket; attractive two-color Morocco finish.
(Also available in 10,000 BTU input model for 30 gal. tanks.)

The revolutionary new method that converts OLD or NEW RANGE BOILERS into highly efficient, attractive AUTOMATIC GAS WATER HEATERS.

•

This is for you . . . . "30,000 cu. ft. annual consumption from an appliance retailing under $35.00 . . . ." There's the story! Your best prospects for profitable, permanent increase in domestic gas consumption are right there in those 30 and 40 gallon tanks. Convert old tanks—make new tanks into fully automatic heaters. Thousands of MIRRO-SHELLS now in use prove it to gas executives.

For complete details, prices, terms—on this and other models—

WRITE

HANDLEY-BROWN HEATER CO.

JACKSON, MICHIGAN

Developers and Pioneers of the Low-input Gas Water Heater

STAR OF THE UTILITY'S LINE

PITTSBURG'S

STORAGE MODEL M-1

If you are looking for a heater that will make history in volume sales records, find out about Pittsburg's M-1, Automatic Gas Storage Type Water Heater. Its multiple sales appeal of "Airated" speed burner, extra heavy insulation, Pittsburg's exclusive rust-resisting process, called Bonderizing, for long life, its powerful eye-appeal in ivory enamel and chrome and its genuinely low price open up a mass market where sales will be brisk and easy to make.

Pittsburg's Streamlined Merchandising plan might be tailor-made expressly for this one model, the way it fits it. This simplified selling plan is described in the "Streamlined Merchandiser". Your copy awaits you on request.

Prove to yourself the salability of the M-1. Write for a sample to put on test. When it comes "give it the works" and it will prove to you that *you* can sell it in a big way.

THE PITTSBURG WATER HEATER CORPORATION

PITTSBURGH, PENNSYLVANIA

Cleaning Coke Oven and Water Gas

By William F. Judd

The Connecticut Light and Power Company

New London, Conn.

THE experience of the Connecticut Light and Power Company in the use of equipment made by the Blaw-Knox Company of Pittsburgh for removing dust and dirt from by-product coke oven gas and of tar and naphthalene from water gas may be of interest. Following the installation of about 60 miles of pipe line from New Haven to Hartford to furnish Meriden, Middletown, Bristol, and Hartford with coke-oven gas manufactured at the plant of the Connecticut Coke Company in New Haven, it was found that some means of dust and dirt removal would have to be provided. The gas received at the metering stations along the line contained quantities of foreign material, which was found to be contributing to pilot outages and other appliance difficulties.

Various types of mechanical filters were found to be only partially successful in overcoming the trouble. After careful study, two 30" Blaw-Knox Cleaners with 100 gal. external oil tanks, for replenishing the oil in the scrubber and sumps for collecting the dust, were installed in 1933. These units were provided with 8" inlet and outlet connections, and were designed to handle a maximum of 140,000 cubic feet per hour of standard gas at atmospheric pressure.

After over three years of operation, it was found that the units had required little attention and that maintenance work was negligible. Tests of the outlet gas showed that it was thoroughly cleaned of dust and other foreign matter. Regular gas oil of 28°-32° Baumé is used in the cleaner. It was found that frequency of oil changes depends largely upon the amount of dirt to be removed and that little oil is lost by evaporization or is carried on by the gas stream.

This performance proved to us that this method of cleaning gas of mechanically entrained particles is highly satisfactory and can be accomplished at a low operating cost and with a small capital investment.

The capacity of water gas generating equipment at Waterbury was increased in 1934. This required the installation of facilities fo · removal of tar and naphthalene. The successful operation of the Blaw-Knox Cleaners on the pipe line gas suggested the desirability of designing a unit featuring the Blaw-Knox Cleaner and the standard United Gas Improvement naphthalene scrubber combined in a single shell to perform the dual work of removing the tar and naphthalene from the crude gas.

A small test unit was installed to determine the effectiveness of this type of cleaner. In making the tests, various grades of oil, water, and water gas tar were tried. The latter proved the most satisfactory for removing tar fog, and gas oil was most satisfactory for the removal of naphthalene. These tests opened the way for the design of a practical unit for removing tar and naphthalene from crude water gas through the combined efforts of engineers of the Blaw-Knox Company, U. G. I., and The Connecticut Light and Power Company. The unit is essentially a standard Blaw-Knox cleaner, with the addition of an extra contactor stage and the U. G. I. naphthalene scrubber combined in one shell.

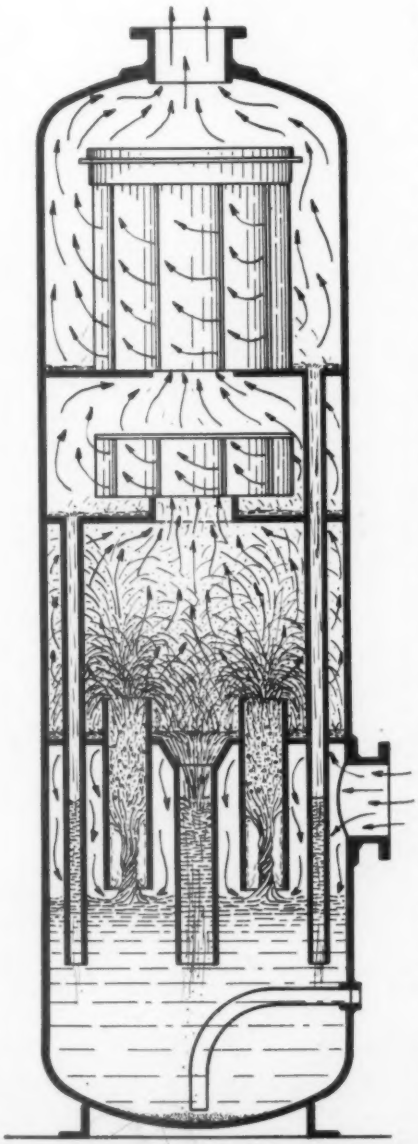


Diagram of typical Blaw-Knox gas cleaner.

The shell is 5' in diameter and 47' high, and has a capacity of 250,000 cubic feet of unpurified gas per hour, at one pound pressure and 80° F. with a pressure drop through the two stages of the Blaw-Knox contactors and mist extractors not to exceed 10" of water.

The unit includes the following compartments: a base reservoir, a tar extractor, comprising a Blaw-Knox contactor section and mist extractor, and a single stage naphthalene scrubbing compartment comprising one single stage Blaw-Knox contractor and including external piping for overflow, equalizer and internal steam pipes. Above this is the regular U. G. I. naphthalene unit.

Each contactor stage has eight contactor tubes, and directly above each set of tubes is a preliminary separator baffle for the elimination of the major part of liquid entrained during this stage.

The unit was provided with 24" gas inlet and outlet connections, and with an oil separator on the outlet to eliminate any free oil. In addition to the oil reservoir in the base, we later installed a 1000 gallon tank in the ground, to collect the oil put through the scrubber. This enabled us to obtain a better settling out of the moisture in the oil. Suitable connections were provided for pumping off accumulated water and for returning the oil to the set.

The oil used in the scrubber is taken from the set oil system and pumped through the scrubber and the collected oil is put back through

the set. The fresh oil circulation is continuous and the rate of flow is metered. A motor driven distributor, at the top of the shell, admits the oil uniformly through 24 individual pipes to the scrubber, from which it flows downward to the reservoir of the second contactor stage and then to the 1000 gallon tank in the ground.

Water gas tar is used as a scrubbing medium in the tar extractor as the first stage for the removal of tar fog, and gas oil in the second stage.

Each stage is provided with an adjustable overflow connection to maintain the proper liquid level.

Some experimenting was required to obtain the maximum efficiency of tar removal. From these tests it was found that a definite seal over the contactor tubes in the first section was necessary to obtain thorough scrubbing action. Once this depth of seal was determined, further increasing of the seal had no effect on the efficiency of tar removal.

The most satisfactory operating temperatures were found to be between 50°-110° F. Installation of a steam heater pipe and lagging of the first three sections were found to be needed to maintain these temperatures and to prevent freeze-ups in extreme cold weather.

From a large number of tests made under different rates of gas flow, the average efficiency of this unit as a tar removed was found to be 90%. This figure may appear to be lower than was to be expected, but difficulties in testing arose which had some bearing on the results due to the fact that it was difficult to separate the light oil from the tar accumulated on the catch thimbles of the test equipment.

Regardless of test figures, however, actual plant operation since January, 1935, has shown that the unit is a very efficient means for removing tar, as careful examination of purifier material during this period has shown no traces of tar or oil getting by the scrubber.

The tar thrown down by this scrubber is low in water content and settles freely in the separator.

Tests made for naphthalene removal have shown that the second stage removes the major part, leaving very little, if any, to be removed by the regular U. G. I. scrubber unit above the Blaw-Knox section.

The success of these installations brought attention to the possibility of doing something to reduce excessive condensate and liquid phase gums at numerous small gas properties operated by the Connecticut Light and Power Company, each having an annual send out of about 60,000 mcf. At these plants, it was important to provide adequate cleansing equipment which would not involve a large initial expense. Accordingly, a Blaw-Knox cleaner was installed at Winsted to remove naphthalene and to reduce condensate and liquid phase gum and mechanically entrained particles of tar fog. A standard 18" Blaw-Knox gas cleaner recently was put into operation. This has a rating of 25,000 cubic feet per hour at 20" pressure, 0.650 gravity gas. It is equipped with low pressure contactor tubes. The pressure drop in this unit, which was installed between the shaving scrubber and the purifier boxes, does not exceed 5" to 6" water.

While this unit has not been in operation a sufficient length of time to arrive at any definite conclusions in regard to its effectiveness as a means of better conditioning of the gas, we have reason to expect that it will eliminate, to a great extent, our trouble with naphthalene, excessive condensate, and liquid phase gums.

Repairing a Gas Holder Leak

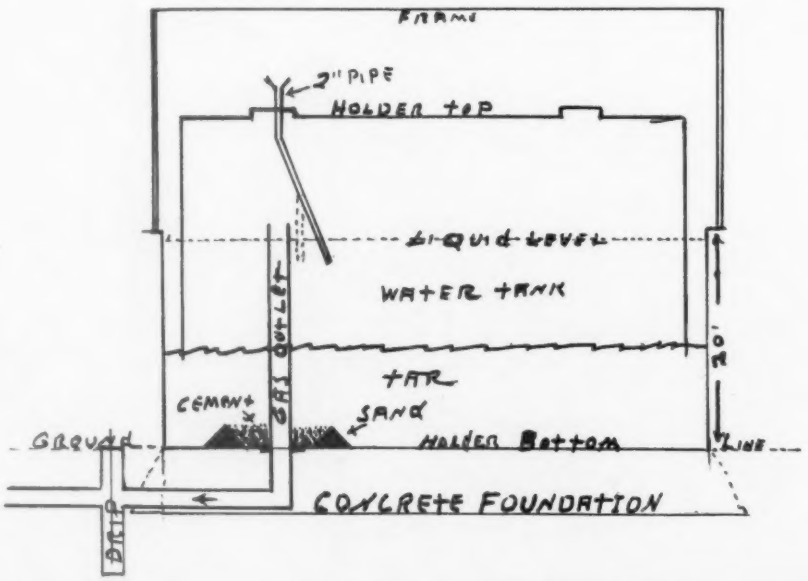
J. S. Rider

Anderson Gas and Utilities Co., Anderson, S. C.

An unusual leak occurred in our 12" Gas Holder outlet line at the Sumter, S. C., plant which was repaired in the following manner without discontinuing the operation of the holder:

The leak was at the flange joint on which the riser was bolted, same being under 21 feet of tar and water. Tar was leaking into the gas drip sealing off the gas supply to the city.

The holder manufacturers were called when the trouble was located; they could give no reason for this joint leaking nor had they ever heard of such an experience. The only remedy they could give was to drain the holder tank and make the repair.



Other gas engineers were consulted, they having the same opinion.

We decided to drill a hole in the top of the holder lift over the inlet riser large enough to insert a 2-inch pipe. This 2-inch pipe was bent as shown in "A" in sketch below, the end of which was about two feet from riser. Sand was poured through this pipe, turning same so as to make a sand ring about four feet in diameter around the riser pipe and on the holder tank bottom. This completed, the pipe was replaced with another, bent as in pipe "B" in sketch below. Concrete mortar was poured through this 2-inch pipe and around the riser pipe so as to be placed within the sand ring and around the 12-inch pipe, covering the flange joint (the sand of course confining the cement). Within 30 minutes after the job was done the leak was nearly stopped, by the next day it was entirely stopped.

SUPERIOR

Diaphragms
Provers
Repairs
Service Cleaners
Gas Meters

SUPERIOR METER CO.
Brooklyn, N. Y.
167 - 41st Street

KEEP THE HOME FIRES BURNING *with Clean Gas*

● An investment in Blaw-Knox Gas Cleaners is an investment in freedom from service complaints.

● It insures continuity of service and customer satisfaction, all dividend payers.

BLAW-KNOX COMPANY
2070 Farmer's Bank Building, Pittsburgh, Pennsylvania

BLAW-KNOX GAS CLEANERS

BLAW-KNOX

New Equipment

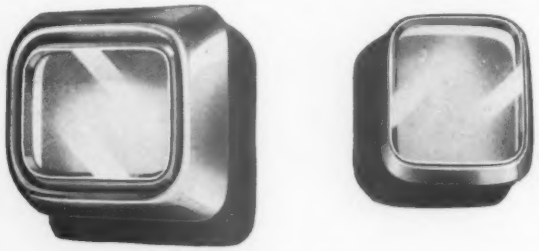
American Meter Company Introduces New Index Box Mounting

Perfecting still further the advantage of the tinned steelcase meter as a sealed instrument, American Meter Company has introduced a gas-tight index box mounting. This contribution is of great significance to gas meter construction because a higher percentage in return per meter dollar invested by industry, and bettered customer relations, are logically predicted. The index window is a new application of "Pyrex" glass. It is resistant to extreme heat and will eliminate breakage due to the character and strength of the glass and the design of the index box frame. This product, made exclusively for American Meter Company, has a metallized (copper) edge by which the glass can be *soldered* direct to the tinned steel index frame—thus effecting a metallic bond and gas-tight seal.

The soldered seal index frame and glass stays gas-tight and leakproof,—25 pounds is the test pressure of this index box assembly. It is unharmed by repeated washings in cleaning solutions, incidental to meter repair work. When a meter is retired from service, its frame and glass may be transferred to another meter.

Since the possibility of index frame leaks are eliminated, the stuffing boxes can be packed tighter, thereby reducing stuffing box friction and variations from accuracy, attributable to this cause.

Index Box Mounting



This frame and glass offers the following advantages: — tests for leaks can be made more conclusive, reglazing will not be necessary when the meter is washed for a major repair or renewal made for any other cause. One estimate of savings on maintenance costs is conservatively figured at 60c during the life of the meter.

The new feature is made available for American Tinned steelcase meters in all sizes utilizing the three or the four-circle index dial.

For equipping meters in the repair shop, the glass and frame are available only as a completely assembled unit. The metal sealing is done by a special process.

Anti-Freeze System for Air Lines

The Tanner Tank air line antifreeze system to eliminate air line and air tool freezing, has recently been improved as shown in the accompanying illustration. This system is stated to be harmless, odorless and non-explosive and will not injure metal, hose or lubrication. Tanner Tanks are built to A.S.M.E. specifications of welded construction for 200 lbs. working pressure and are easily installed. Descriptive bulletin is issued by Sullivan Machinery Company, Michigan City, Indiana, who guarantee the system's operation down to 70 degrees below zero.

Silex Automatic Gas Water Heater

A new gas water heater has been placed on the market by the Silex Company of Hartford, Conn. This square design harmonizes nicely with modern backbars.

The outer shell of the heater is stainless steel in satin finish and the inner shell is heatertinned copper. Entirely automatic, this heater has a thermostatic temperature control which may be adjusted to provide water at any desired temperature between 140° and 190°.

Silex Water Heater

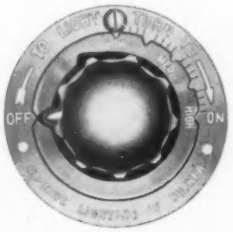
The water level is maintained by a simple, quick-action float. A line to the drain eliminates any danger of overflowing.

The tank has a capacity to supply largest models of commercial Silex. This automatic gas water tank has low b.t.u. consumption, as the gas is automatically turned down when the water reaches a desired temperature. Size of the unit shown is 10½ inches square and 25 in. high with maximum burner rating of 11,000 b.t.u. and offer low consumption.

and Appliances

Heavy Duty Ranges

"New Standards for Restaurant Cooking" is the title of a well illustrated bulletin recently issued by American Stove Company of Cleveland, Ohio.



Dial for Top Hheat Control

Magic Chef 32 Inch Unit

The improved "Uniform Heat Top" is featured showing graphically in color the heat distribution which has dial temperature control as shown in the cut for low, medium or high temperatures. The 32" unit shown has two rectangular cooking plates each 16" x 24" with separate control for each. The 48" unit similarly arranged has three cooking plates. Space saving, even heat distribution and flexible control are among the outstanding features of these units which are installed in food service organizations of national prominence.

Gil Radiation Computer

The adjoining illustration shows a handy device which obviates the old method of taping and pacing when estimating floor, wall and window dimensions in connection with heating and air conditioning installations, service lines and mains. It affords a quick and accurate method of making measurements. Made by Gas Industry Laboratories, 12-22 30th Ave., Long Island City, N. Y.

New Water Heater Has Novel Features

A new type of automatic gas water heater introduced by the United American-Bosch Corporation, Springfield, Mass. Known as the "Kabinette" model, was developed to provide a compact, efficient unit that would harmonize with modern kitchen design. Its metal housing or cabinet is 25 inches square and stands 36 inches high. Finished in white enamel with black trim and chrome plated top, it harmonizes with other kitchen appointments.

The chromed top is flat and being the same height as the average range, table or counter, it provides additional useful table surface for kitchen or laundry. Entirely automatic in operation, the water in its 20 gallon storage tank is kept at a predetermined temperature.

A recovery capacity of 28 gallons per hour assures a constant supply of hot water at all times, more than ample for the average family. The use of an extended "fin-type" heat exchanger rather than a conventional copper coil is said to utilize the utmost heat content of the gas consumed resulting in remarkably low operating cost and long life of heater because it eliminates condensation and its twin brother, corrosion. Efficiency and economy are also improved, it is claimed by the use of a spherical or globe shaped tank.

The American-Bosch Ball-Tank, an exclusive feature, claims many advantages. It is based on the principle that a sphere will resist great internal pressure and hold a large volume within a small outside surface. Thus, maximum strength is provided with minimum radiating surface. Furthermore, insulating material can be packed completely around the tank without seams, joints or exposed parts with which to contend.

Operation is stated to be equally economical whether a large or small quantity of water is heated. In other words, whether the user draws 30 gallons per day or 100—the operating cost per gallon is practically the same.

Personals

Le May With Connecticut Light and Power

R. C. Le May has accepted the post of Industrial Engineer for the Connecticut Light & Power Co. with headquarters at Waterbury, succeeding W. W. Young, Jr. Mr. Le May formerly served for several years as Industrial Engineer with Brooklyn Union Gas Company.

Daniel L. Jerman Joins Pittsburgh Equitable Meter

Announcement has been made that Mr. Daniel L. Jerman has joined the sales staff of the Pittsburgh Equitable Meter Company. He will represent the company from the New York City office. Mr. Jerman has been with the Purchasing Department of Columbia Mills, Inc., and with the Vault Door Sales Department of Diebold Safe and Lock Company.

Colonel W. F. Rockwell Heads Board of Spring Company

Announcement has been made of the election of Colonel Williard F. Rockwell, President of the Pittsburgh Equitable Meter Company, Pittsburgh, Pa., to the Chairmanship of the Board of Directors of the Standard Steel Spring Company, Coraopolis, Pa. His activities in the automobile industry have extended over a long period of years, and at present he also holds the Presidency of the Timken-Detroit Axle Company.

In addition to being President of the Pittsburgh Equitable Meter Company and its subsidiary, the Merco Nordstrom Valve Company, Colonel Rockwell holds the presidency and directorships in numerous other companies furnishing equipment to the oil and gas industries.

With all these duties, Colonel Rockwell still finds time to take an active part in military affairs. As an advisory officer of the War Department's new Program of Motorization and Mechanization of its Ground Forces, he saw recent active service, being stationed at Camp Holabird, Baltimore, Maryland.

Catalogs and News

Partlow Pocket Catalog

A pocket-size catalog of their gas controls for high and for low pressure, electric temperature controls and dial thermometers is issued by The Partlow Corporation, New Hartford, N. Y. These are designed for use where accurate temperatures not exceeding 1000°F. are to be maintained such as ovens of all types, soft metal furnaces, glue heaters, stokers, annealing and heating furnaces, etc. In these controls mercury is used as the actuating medium and the elements are sealed with a composition diaphragm that is not compressible and may be replaced in case of misuse or accident.

Titan Valve Manufacturing Co. announce change of address to their new factory and office building at 99193 Elk Avenue N. E. Cleveland.

Hammer-Bray Ranges

"Spark" gas ranges are described in a folder issued by Hammer-Bray Co., Oakland, Calif. Among the special features illustrated are adjustable grid, "hi-low" burner, lid top and built-in gas circulating heater which is an exclusive feature of Spark ranges.

C. J. Tagliabue Co., Park & Nostrand Avenues, Brooklyn, N. Y. announce improvements in their line of self-operating temperature controllers. This new model is suitable for industrial applications where the close control obtainable with auxiliary power is not necessary or where the steam pressure available is less than 10 pounds per square inch. Temperature ranges are approximately 75° between the limits of 30°F. and 450°F. The valves are semi-balanced, in sizes from ½ inch to 2 inches. Described in Bulletin 1142.

News Notes

Municipal System Voted

Voters of Moundridge, Kan., have approved a $35,000 bond issue for the construction of a municipal gas distribution system.

Moundridge at the present time is supplied by a plant owned by the Kansas Power and Light Co. with headquarters at Topeka.

Items of Interest from Canada

T. Bradshaw has been elected President of the Consumers' Gas Co., Toronto. For the year ending Sept. 30, the company reports a gross revenue from the sale of gas and appliances of $5,226,763.

One of the largest gas wells ever drilled in this area was brought in a few days ago by the Kelly Gas & Oil Co. of Toronto at Hagersville. Mr. C. D. Smith, the Field Manager of the company reports that the well tested 990,000 cubic feet when checked by the Dominion Natural Gas Co.

The Dominion Natural Gas Co., which has purchased the municipal artificial gas plant at St. Thomas, has opened a fine office and showroom. The local branch which is managed by L. D. Burdick, will employ an office and service staff of 25 people, when a complete survey of the city has been made. In addition to a modern office and showroom the building contains an employee's recreation club and equipment rooms.

Much activity in the natural gas field is apparent at Tillsonburg as A. B. Holmes is having a pipe-line laid along C. P. R. right-of-way from his new well four miles south of the town. In addition Mr. Holmes is having a line laid from another well at Straffordville, a distance of nine miles from Tillsonburg. The first named well has a daily flow of over a million cubic feet per day.

Sixteen producing oil wells have recently been struck near Brownville, with an average flow of a million gallons per day. The complete flow has been contracted for by a newly formed company the Aloka Oil Co., Ltd., with head office in Toronto. The company will at once proceed to build a purification plant and a 12 mile pipe line to Ingersoll at an estimated cost of $150,000. On behalf of the Dominion Natural Gas Co., of Buffalo, N. Y., President Sieverson has signed an agreement to purchase the gas which will go to Ingersoll, Woodstock, Brantford and up to Hespler, in a line now fed from the Tilbury field.

The Dominion Natural Gas Co., is planning on the complete overhauling of the pipe lines of the old municipal gas plant at St. Thomas. This has been found necessary in order to supply the homes in the city with gas for heating systems.

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News of the Industry

Report of Operating Division Meeting of the New England Gas Association

THE New England Gas Association Operating Division meeting held at the Parker House in Boston, January 8 and 9, 1937, had the biggest attendance of any such meeting to date. Report of the nominating committee was adopted and D. Reynolds of Boston elected as chairman of the section for the ensuing year.

Mr. C. H. Thatcher of the New Haven Gas Light Company presented a paper on the "New Types of Joints in Mains, Services and Plant Piping." This paper covered the small as well as the large piping. The Dresser Company development of a boltless gland for piping up to 2" in diameter was mentioned as being an advantage in many places where threading was not satisfactory. The decided advance in mechanical joints and bell-and-spigot clamps following the study of the subject by the A.G.A. was outlined.

Mr. David P. Allen of the Washington Gas Light Co. gave a paper on "The Economical Aspects of Meter Maintenance." Mr. Allen particularly emphasized the need for accurate records on which to base policies. The results that can be accomplished through analysis of meter maintenance were illustrated by the expenses of one company, which were reduced from approximately $137,500 for the year 1930 to approximately $96,800 in 1931. The reduction resulted mostly from a revision of a repair schedule which changed the proportion of meters given general diaphragm repairs. Mr. Allen indicated that it was necessary to keep constantly in mind that meters as made today are greatly improved over meters made from fifteen to twenty years ago, adding that a much longer sustained accuracy and economical life may reasonably be expected.

Mr. R. G. Stuart, Jr. of the Fall River Gas Works spoke on "The Installing and Servicing of Non-Tank Water Heaters." Mr. Stuart mentioned that a survey of all homes, whether having gas service available or not in Fall River, was made and 70% were found to have no hot water facilities available. Fall River is in an industrial section which has not enjoyed particular prosperity in recent times. Realizing that a large market existed, a study was made of all types of automatic water heaters and a type of unit somewhat similar to one in use in Europe for a number of years was selected. This small unit heater is of the instantaneous type but in place of coils a vent type heater is provided. The heater is so designed that it is intended to replace the cold water faucet in the kitchen sink, as it has two separate faucets one of which supplies cold and the other hot. A yellow flame burner is provided, which as received from the manufacturer would burn up to 105 cu. ft. per hour of manufactured gas. The 105 ft. per hour was found to be entirely too high as it would result in carbon deposits on the vents and also might result in undesirable flue gas conditions. Laboratory tests indicate that 60 cu. ft. per hour was the optimum consumption and to assure that adjustments by outside agencies would not cause an increase, orifices were inserted into the inlet line. Certain restrictions were established as to location. The heater would not be set in a bathroom nor underneath shelves even in a large room unless the part of the shelf immediately above the flue was cut away.

To provide the lowest consumption and most satisfactory service, it is necessary to install the heaters at or in close proximity to the point of maximum use. Where it is desired to run an additional line into tubs or for a short distance into the bathroom, or other desired location, a connection is provided on the back of the heater. Small copper tubing is used for this purpose.

It was reported as being impractical to connect the heater into regular house piping as the conducting of water for any considerable distance resulted in too great a temperature drop.

The merchandising policy followed was to have only plumbers install the heaters. Thirteen hundred and sixty (1360) were installed in the course of six months. The plumbers were cautioned against attempting to provide too fancy an installation. A flat price to the plumber was considered but after finding certain difficulties, the policy of paying the plumber on a labor and material basis with a maximum limit of $10 was adopted. Should the plumber estimate that the cost would exceed $10 it was then necessary for him to deal direct with the customer in regard to the excess and charge the amount direct to the customer.

One-half inch connections were adopted as standard for both gas and water. To facilitate the removal of the heater for servicing a union was installed on the heater side of the shut-off cocks. In forty-four working days, following the installation of one thousand heaters, 279 service calls were received. The majority of these calls required only educating the consumer in the use of the heater. The small size of the heater naturally restricts the flow and many felt that by adjustment such flow could be increased. Eventually, the flow of water was reduced to three quarters of a gallon per minute in 10% of the cases. 4% of the complaints required adjustment of the regulating valve. 17% of the complaints were adjusted to the customer's satisfaction by indicating that too much water could not be expected. 9% of the complaints required increasing the gas flow as adjustment had been made below the 60 cu. ft. per hour desired. In other instances the pilot flame was too low to allow the heater to operate, rust blocked the water screen, the water pressure was too low to operate the heater, leaky diaphragms and similar minor troubles.

The heater is particularly adaptable for poor water pressure conditions as it will operate satisfactorily between 6 and 60 lbs. water pressure. This feature is valuable where the pressure in mains may be uniform or the age of the services or size has resulted in inadequate supply.

The heaters are sold on a rental plan of 25c per month for the first twelve months and 50c thereafter. In the first six months there were only seventeen reverts out of 1340 heaters sold.

Boston Consolidated Announces Changes

Four major changes in executive personnel of the Boston Consolidated Gas Co. were announced January 5 by E. M. Farnsworth, vice-president and general manager.

Frank D. Cadwallader, for 10 years vice-president in charge of sales, has been advanced to a newly created vice-presidency in which he will have charge of public relations.

J. J. Quinn, who has been assistant to Mr. Cadwallader, becomes the company's sales manager in direct charge of sales operations.

E. H. Eacker has been named assistant to Mr. Farnsworth.

R. W. Menard becomes superintendent of the investigation department in addition to his present duties as head of the application department.

Appointed Utility's Manager

J. S. Holt has been appointed manager of the Raleigh (N. C.) Gas Co., succeeding Harold W. Gee, who has been transferred to Johnston City, Tenn.

Handling Three Thousand Service Calls a Day

Description of New Customers' Accounting Center

THE customers' accounting center of the Consolidated Edison Company of New York at Rider Avenue—at which is concentrated all the gas and electric commercial relations accounting work of the entire Borough of The Bronx—was placed in operation on December 28. Now all gas and electric customers in The Bronx call one telephone number—Mott Haven 9-4000.

Rider Avenue, with 1,500 employes, functions for 400,000 customers who have 840,000 gas and electric meters. It supplies a centralized telephone service, and by means of units of 50,000 gas and electric meters each, cares for all ledger, billing, and credit and collection operations. Other units care for all the remaining phases of customer accounting, including meter reading, addressographing, machine billing, collections, payment receipts, statistical analysis and journal, deposit control operations, and personal service, which includes adjustment of high bills and satisfying customer inquiries.

A unit of the company's General Office Service Department supplies mailing, filing, stenographic, and messenger service.

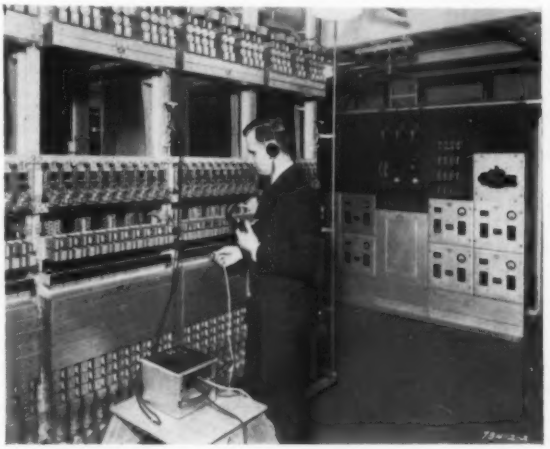
The centralized telephone service supplants that formerly supplied by five affiliated companies at four separate points —and the gas and electric accounting activities take the place of those formerly conducted at four points in the Borough.

The throwing together of such a large number of accounts is probably the largest operation of its kind ever attempted by a utility company in this country.

Consolidation of these activities by chance coincided with the merger of the Bronx companies, the Rider Avenue center opening five days after the merger of the Bronx Gas, Northern Union, and Central Union companies into Consolidated Edison.

Probably the most unusual feature of Rider Avenue is the forty-position telephone order table known to technicians as a "number three automatic turret. It is the first of its kind in New York. Cardinal feature of the turret is its operation by trained telephone service clerks in touch with accounting, sales, and service activities, rather than by switchboard operators. One telephone call is all the customer needs to make whether he has a "lights out" plea, a turn on order, a request for gas appliance adjustment, an inquiry about the price of radios, or a question on the status of his account.

One telephone call turns the trick in every instance, for the customer is never under any circumstances told to call another number. He gets what he wants when he wants it. Telephone mechanism enables the service clerk to take the order without delay, to secure desired information by private dial system while the customer waits, or to conduct a three-way "conference" conversation in which the customer and a third employe, such as an accounting unit clerk or anyone else at Rider Avenue, take part. The customer's need is filled in a fraction of the time formerly required.



The telephone equipment room at the Rider Avenue customer accounting center.

A close-up of the telephone order board. A conveyor belt is shown in the middle of the picture.

A conveyor belt moving at four hundred feet a minute runs the length of the telephone order table, connecting the service clerks with review clerks, electric dispatchers and a battery of ten teletypewriter machines, which are in turn connected with the Webster Avenue customer service shop, the Purdy Street shop, the Gas Appliance Maintenance Division at 408 E. 111th Street, and the electric sales departments at the Melrose, Tremont, and Fordham business offices.

A traffic control turret stands beside the supervisor's desk to keep her posted on the order table's operation and, through a distress signal, to warn her of waiting calls. An observation board enables her to "listen in" on the handling of calls. An automatic recorder registers the number of calls received at each order table position while a conventional switchboard handles intra company calls.

Most important to customers who do not like to be kept waiting is the automatic telephone distribution mechanism, a device which, without the help of human hands, distributes incoming calls in the order in which they are received. If the lines are humming with business, with no positions available, the mechanism "stores" excess calls until it can distribute them in the order of their receipt at the order tables. In doing so it keeps the supervisor posted on the number of calls handled and the number not answered within ten seconds. Further, it enables the service clerks to transfer misdirected calls and to establish the three-way conversation mentioned above.

Not only do fifty incoming trunk lines terminate at the automatic distributing mechanism, but a private dial system with 390 telephone extensions, mostly at Rider Avenue, links the order table through fifty leased-wire tie lines with all business offices in the Bronx, as well as with 4 Irving Place, 41st Street and 111th Street, Manhattan.

Handling 3,000 or more calls a day, Rider Avenue's telephone set-up must follow a twenty-four hour schedule, peaks and valleys in the load being handled by increasing or decreasing the number of occupied positions at the order table.

Routine business handled by the order table includes orders for the turning on or off of gas or electric service, customer accounting information, service maintenance requests, such as "lights out," leaks or improper appliance operation, and emergency calls.

Upon receipt of a "lights out" call, the service clerk rapidly fills out an order blank and speeds it to a review clerk by conveyor belt. If the order concerns a point west of the Bronx River, the clerk sends it to dispatchers via conveyor belt who telephone it to repair men "on the district." If the lights have failed at a point east of the Bronx River, the review clerk sends the order by conveyor belt to the teletypewriter operators who transmit it to Purdy Street.

A turn-on order is handled in similar fashion. Again calling "Mott Haven 9-4000," the customer places his order with one of the telephone service clerks who speeds it to a review clerk by the conveyor belt system. Thence by messenger it goes to the proper accounting unit for credit approval, and to the teletypewriters for transmission to the proper shop where a fitter is assigned to the actual turn-on operation. Until the work is finished, the original application and related papers are kept in the order information file for ready reference.

Closely connected with the centralized telephone service are eighteen bookkeeping units, each handling all bookkeeping, credit and collection work for 50,000 gas and electric meters. The personnel of a typical unit includes a supervisor in charge, an assistant supervisor, five credit and collection clerks, sixteen bookkeepers, and two information clerks. The information clerks are equipped with headset telephones and are the first persons in the accounting unit to whom the telephone service clerks turn for information.

In addition to these eighteen bookkeeping units there are thirteen divisions and units handling general accounting activities which could not be handled as well if they had been split up among the bookkeeping units. Operations falling within these separate divisions are personal service, meter reading, order distribution and control, journal control, meter control, deposit control, addressographing, machine billing, etc.

Since these activities are all tied in with the eighteen units of 50,000 meters each, a complete co-ordinated commercial organization is the result. All work on customers' ledgers, except machine billing, is handled within the bookkeeping units of 50,000 meters, and there is no need to remove the ledgers from the units except for monthly billing operations. This leaves the ledgers free for rapid reference by the telephone information clerks upon inquiry from the telephone order tables, from the business offices, or from any other point.

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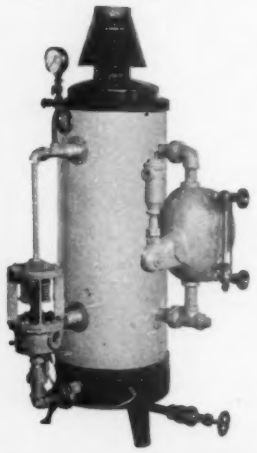

P. M. LATTNER MFG. COMPANY
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The Golden Faucet Automatic Gas Water Heater Contest for 1937, Sponsored by A.G.A. and A.G.A.E.M.

Two nation-wide campaigns to promote the sale of automatic gas water heaters have been announced, as the American Gas Association and the Association of Gas Appliance and Equipment Manufacturers launched their double "Golden Faucet Contest for 1937." With substantial cash awards and merchandise prizes, the contest will extend from February 1 to September 30, 1937, with option to gas companies to start January 1 and end August 31.

The Water Heating Committee of the Commercial Section, sponsors of the A.G.A. Golden Faucet Contest, will enlist the support of gas companies and their salesmen for the eight months' drive, while the A.G.A.E.M. Golden Faucet Contest, under the sponsorship of the Gas Water Heater Division, will be limited to retail dealer outlets.

Grand cash awards, medals, company plaques of merit, and monthly cash prizes amounting to nearly $18,000 are offered by the A.G.A. contest leaders to winning companies and salesmen in seven divisions, classified according to the number of meters they serve, and in proportion to the number of salesmen expected to compete. For eight months' sales records, 65 salesmen will share $3,200. Each month during the contest, 180 salesmen will be awarded ten-dollar cash prizes; with gold, silver, and bronze medals for those who can repeat this performance. At the A.G.A. Convention in 1937, 21 plaques of merit will be presented to companies which led in the contest.

In the A.G.A.E.M. Golden Faucet Contest for retail water heater dealers, $12,000 in merchandise prizes will be offered. Seven districts, comprising the entire United States, have been mapped out on the basis of uniformity of sales conditions. In each district, ten prizes will be offered. They consist of automobiles, home radios, car radios, washing machines, refrigerators, office furniture, silver sets, watches, guns and traveling bags.

Throughout the campaign, dealers will receive monthly mailings offering advertising and merchandising plans for building their sales. Local tie-ins are urged, with individual sponsors furnishing material for window displays, newspaper and outdoor advertising.

Rules for both contests are simple. Every water heater supplied by a Golden Faucet Contest sponsor will carry a tag, valued at one point for an automatic heater and one-half point for a conversion heater. Salesmen and dealers will be rated according to the number of points earned. In case of ties, duplicate prizes will be awarded.

Nineteen manufacturers are underwriting the cost of the Golden Faucet Contest in both its divisions. They are: American Gas Products Corporation, Autogas Corporation, The Cleveland Heater Company, Crane Company-Premier-Heater Division, EverHot Heater Company, Gas & Electric Heater Company, Gerstein-Cooper Company-Gas Equipment Division, Handley Brown Heater Company, The Hotstream Heater Company, Hynes & Cox Electric Corporation, Lawson Manufacturing Company, Lovekin Water Heater Company, Pittsburg Water Heater Corporation, Ruud Manufacturing Company, The Sands Manufacturing Company, United American Bosch Corporation, Welsbach Company, Whitehead Metal Products Company, John Wood Manufacturing Company.

C. M. Kemp Mfg. Co. Enlarges Plant

Expanding business, resulting from constantly increasing demand for Kemp Immersion Heating and other products for industry, has necessitated the plant enlargement of the C. M. Kemp Manufacturing Company, 405 East Oliver Street, Baltimore.

The new building will be a one-story, steel and brick structure, covering 7200 square feet. It will be used for the recently expanded welding department and for heavy machine assembly.

Dresser Promotes

Recent changes just announced, and effective as of January 1, 1937, in the personnel of the S. R. Dresser Manufacturing Co., of Bradford, Pa., include the elevation of M. N. Davis from Vice-President in Charge of Sales to Executive Vice-President. Mr. Davis also continues as Secretary of the Company.

H. P. Boncher, formerly Assistant Sales Manager, is now Sales Manager. New Assistant General Manager is R. E. Reimer, who takes on this new position in addition to his duties as Treasurer. H. N. Mallon continues as President and General Manager. F. A. Miller is Chairman of the Board.

Renaissance of Credit

Public Utilities have scheduled a series of meetings of the credit men of the industry during the forthcoming Seventh Credit Congress of Industry, which will be held in conjunction with the 42nd Annual Convention of the National Association of Credit Men, at the Hotel Stevens, Chicago, Illinois, June 21 to 25, 1937.

This group of credit executives is headed by R. W. Forwood, Consumers Power Company, Grand Rapids, Michigan, as national chairman, and A. A. Ergens, New York Edison Company, 4 Irving Place, New York City; Edward R. Cullis, Tennessee Electric Power Company, Chattanooga, Tennessee; Claude A. Parks, Southwestern Gas and Electric Company, Shreveport, Louisiana; and Albert R. Foster, San Diego Consolidated Gas and Electric Company, San Diego, California, as national vice-chairmen.

In addition to a very constructive program pertaining to the credit ills of the industry, there will be roundtable discussions of their experiences in business with the recent enactments of the Robinson-Patman and the Social Security Acts. This information will not appear in book form for many months thereafter.

According to R. W. Forwood, he anticipates the largest attendance in the history of the Public Utilities division and urges every firm in the industry to send their credit executives and make preparations now to attend. Your credit representatives will make many valuable contacts during these meetings as well as discussing many helpful suggestions of modern credit practices and procedures, which are so important to management and R. W. Forwood will welcome their communications.

National Radiator Appoints Montague

C. L. Crouse, Vice President, National Radiator Corporation, has announced the appointment of W. B. Montague as Advertising and Sales Promotion Manager.

Previous to his joining National Radiator, Mr. Montague was Sales Promotion Manager for the Surface Combustion Corporation of Toledo, Ohio, and served in a similar capacity with the Delco Appliance Corporation of Rochester, New York. Mr. Montague will be located in the General Offices of the Corporation in Johnstown, Pa.

Lincoln Makes West Coast Appointment

Appointment of W. R. Smith to the sales staff of its Los Angeles office, 812 Mateo Street, is announced by The Lincoln Electric Company, Cleveland, Ohio.

Mr. Smith has been employed in the welding field for 10 years. For 3 years he was employed on the Boulder Dam project as a foreman. With this extensive background, Mr. Smith can be of great assistance to users of welding in the Los Angeles area who have problems relative to the use of welding either in manufacturing, construction or maintenance.

The "Heavy" Bushel

WHEN buying gas purification material in mixed form, its value to you should not be measured merely by the price per bushel —but the percentage of active Iron Oxide content actually available for hydrogen sulphide removal should be considered.

Do you know that the Connelly Iron Sponge *bushel* weighs more, and "runs heavier" in active, hydrated, alkalized Ferric Oxide?

This represents increased capacity for sulphur removal, sustained activity and prompt revivifying after repeated foulings. In terms of operation, it means longer service in the boxes, and reduced cost of gas purification.

Connelly Products: Unmixed Iron Oxide—Back Pressure Valves and Gas Screens—Regulators for District, Station, Service, or Appliance—Caloroptic BTU Indicators—H_2S Testers—U-Gauges—Smyly Mercury Loaders—Counter Balanced Manholes—Distribution Supplies

For proven economy, specify Connelly Iron Sponge, made with selected wood filler by a patented, controlled process that insures a uniform, dependable product. Write for Bulletin No. 100-B-1.

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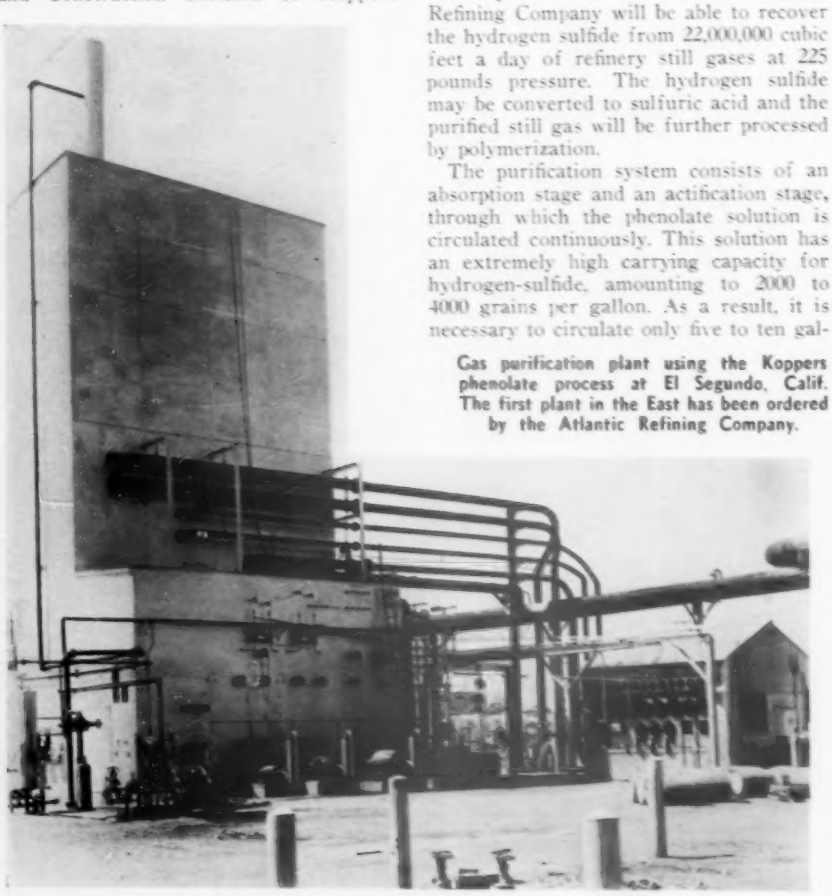
Koppers Phenolate Gas Purification Process

The first plant in the east which will purify refinery gas by the new Koppers phenolate process, is to be erected soon for The Atlantic Refinery Company at its Philadelphia refinery, by the Engineering and Construction Division of Koppers Company. A similar plant, the first to use this patented process, was erected by Koppers Company at El Segundo, near Los Angeles, Calif., for the Standard Oil Company of California, and was put into operation Aug. 6, 1936 and is shown in the adjoining illustration.



Gas purification plant using the Koppers phenolate process at El Segundo, Calif. The first plant in the East has been ordered by the Atlantic Refining Company.

By this process the gas is prepared for treatment in a polymerization unit for production of liquid hydro-carbons, being purified to the extent of 95 percent to 99.8 percent.

The plant to be built for The Atlantic Refining Company will be able to recover the hydrogen sulfide from 22,000,000 cubic feet a day of refinery still gases at 225 pounds pressure. The hydrogen sulfide may be converted to sulfuric acid and the purified still gas will be further processed by polymerization.

The purification system consists of an absorption stage and an actification stage, through which the phenolate solution is circulated continuously. This solution has an extremely high carrying capacity for hydrogen-sulfide, amounting to 2000 to 4000 grains per gallon. As a result, it is necessary to circulate only five to ten gallons of solution per thousand cubic feet of sour gas. This low circulation rate is one of the reasons for the low operating expense and the simplicity of equipment required in comparison to other liquid purification processes.

The hydrogen-sulfide laden gas enters the absorber at the base, passes up through bubble-cap trays and leaves at the top, stripped of 95% of its hydrogen-sulfide. The solution leaving the bottom of the absorber, saturated with hydrogen-sulfide with respect to the incoming gas, passes through the heat-exchanger tubes to the top tray of the actifier. It flows down over the actifier trays, counter-currently to the stripping steam which is generated in the reboiler at the base. Sufficient indirect steam is used to effect the desired degree of actification of the solution. This, in turn, is determined by the maximum residual hydrogen-sulfide desired in the exit gas.

The actified solution flows from the reboiler through the heat-exchanger shell, is further cooled in the solution cooler, and is then pumped to the fourth tray below the top of the absorber. The absorption cycle starts again at this point.

Hydrogen-sulfide laden steam passes from the top of the actifier to the dephlegmator shell and thence the hydrogen-sulfide is forced, by the actifier pressure, to the acid plant burner or other point of disposal. Condensate from the dephlegmator returns to the actifying column.

Fresh water is added continuously to the top tray of the absorber. The three top trays comprise, in effect, a water scrubber to recover chemicals which have been entrained or evaporated from the solution. It is necessary, at periods of several days, to replenish chemicals lost from the system, and a small mixing tank is provided for this purpose. The caustic soda and crude phenol used in the process are inexpensive.

This system is completely adaptable to conditions peculiar to individual projects.

Fowlston Now Executive Tri-County Gas Co.

C. J. Fowlston, former general superintendent of the North American Oil and Gas Co. and the Northern Natural Gas Co., with headquarters at Amarillo, Tex., since 1930, has resigned to become an executive of the Tri-County Gas Co. at Scott City, Kan.

Scholl Named Superintendent Corsicana Division

Leon M. Scholl, formerly superintendent of distribution for the El Paso plant of Texas Cities Gas Co., has been appointed superintendent of the Corsicana division of Community Natural Gas Co.

B. B. Stringfellow, former district manager for the Community Natural at Cleburne, has been transferred to El Paso to succeed Mr. Scholl. He is succeeded as district manager at Cleburne by Phillip E. Warren, formerly in charge of the industrial installations and meter shop at El Paso.

WARNING

Winter peaks ahead! G.P.M. in your purifiers . . means clean gas in the holder . .

GDM

IRON HYDROXIDE

GAS PURIFYING MATERIALS COMPANY, INC.
L. I. City, N. Y. & Providence, R. I.

A.G.A.E.M. To Conduct Exhibit At Natural Gas Convention

In connection with the Convention of the Natural Gas Department of the American Gas Association to be held in the new Municipal Auditorium at Kansas City, May 10 to the 14th, the Association of Gas Appliance and Equipment Manufacturers will conduct an exhibition of gas appliances and equipment.

While the American Gas Association Convention includes both the Natural Gas Industry and the Manufactured Gas Industry, those engaged in the Manufactured Gas Industry were predominant in attendance, and consequently the exhibit of appliances and equipment used in the Manufactured Gas Industry likewise predominated. Years ago, when the Natural Gas Industry had an independent organization, known as the Natural Gas Association, large and interesting exhibitions were held every year in connection with the Natural Gas Conventions. Those exhibitions, while undoubtedly, on a par with the exhibitions held in connection with the American Gas Association in points of size and interest, differed in one important respect. While the appliances shown were essentially the same, the nature of the equipment exhibits was different, as the equipment displayed to the Manufactured Gas men was for the production and handling of manufactured gas, while equipment shown to the Natural Gas men was almost entirely confined to production and transportation equipment in the natural gas fields.

There has been, unquestionably, as much if not more advancement made during the past several years in the natural-gas equipment as in manufactured-gas equipment. However, since the merger of the American Gas Association and the Natural Gas Association, all of the exhibitions have been held in conjunction with the American Gas Association Convention and usually in the East where it seems impracticable to the manufacturers of heavy natural-gas equipment to exhibit.

It is expected that the Convention of the Natural Gas Department in May will be one of the largest and most enthusiastic meetings of its kind ever held, and many leaders in the Natural Gas Industry, as well as manufacturers, have expressed the desire that there might again be a large and representative exhibition of modern gas appliances and natural-gas equipment in conjunction with the Convention of their department. It is anticipated that that desire is general throughout the entire industry. Therefore, by formal action of the Board of Directors of the Association of Gas Appliance and Equipment Manufacturers, it was decided to conduct such an exhibition and to earnestly solicit the support of their entire membership as well as that of all manufacturers of natural-gas equipment and appliances who at the present time may be non-members.

At an early date a prospectus will be sent to every manufacturer who should be interested, with complete details as to available space, etc. The exhibition space will, of course, be limited to the capacity of the exhibition hall and as allotment of space will be made in the order of the receipts of applications, the Committee suggests that those who desire to exhibit get in their applications at as early a date as possible.

National Commercial and Hotel & Restaurant Sales Conference To Be Held In Philadelphia, Pa.

The annual get-together of all gas utility men and appliance manufacturers interested in the sale and servicing of hotel, restaurant and lunch room cooking, as well as all other commercial gas applications, will take place at the Benjamin Franklin Hotel, Philadelphia, Pa., Tuesday and Wednesday, March 2 and 3. This will be the National Commercial and Hotel & Restaurant Sales Conference held under the sponsorship of the Industrial Gas Section of the American Gas Association. The Pennsylvania Gas Association will join the Conference in lieu of holding their annual sales meeting.

Sales will be the chief theme of this Conference, although the present status of gas appliance development and competitive equipment development will receive close attention.

The great diversity of the businesses conducted by our commercial customers makes it desirable to have brought before the Conference the views of as many salespeople as possible. Hence a feature of the Conference will be symposia on three important fields of gas sales. These are Commercial Space Heating, Volume Water Heating and Commercial Cooking. The discussion leaders in each instance will be men of prominence who have made outstanding records in their fields.

Another feature will be a semi-technical description of the new commercial size gas refrigerators, as well as a presentation of sales plans for launching this new outlet for gas.

Plans for the conference have been made by C. E. Lucke, Jr., Chairman of the Commercial Cooking & Baking Committee; J. F. Quinn, Chairman of the General Commercial Committee; Frank H. Trembly, Jr., F. T. Brooks, and H. N. Squier and H. S. Christman, president and vice president respectively of the Pennsylvania Gas Association.

B. A. Seiple Made V. P. in Charge of Sales

B. A. Seiple, general sales manager of the Jersey Central Power and Light Co., has been named vice-president in charge of sales, according to the announcement of Thomas R. Crumley, president.

The position is a newly created one and, in his statement, Mr. Crumley says that the appointment was made "in recognition of the excellent work which Mr. Seiple has accomplished during the past few years."

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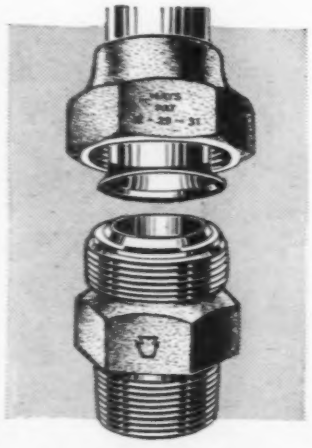
are better than ONE



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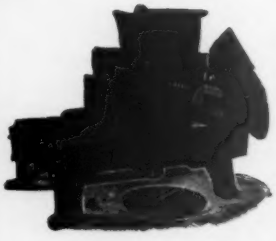

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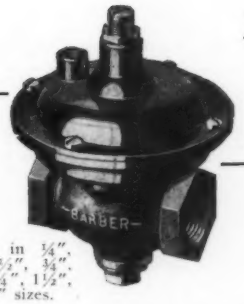

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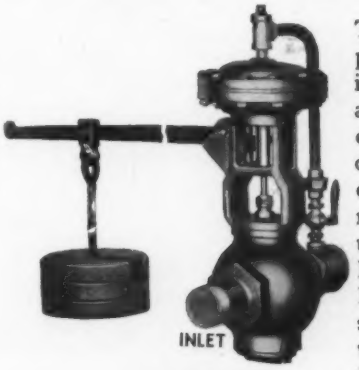

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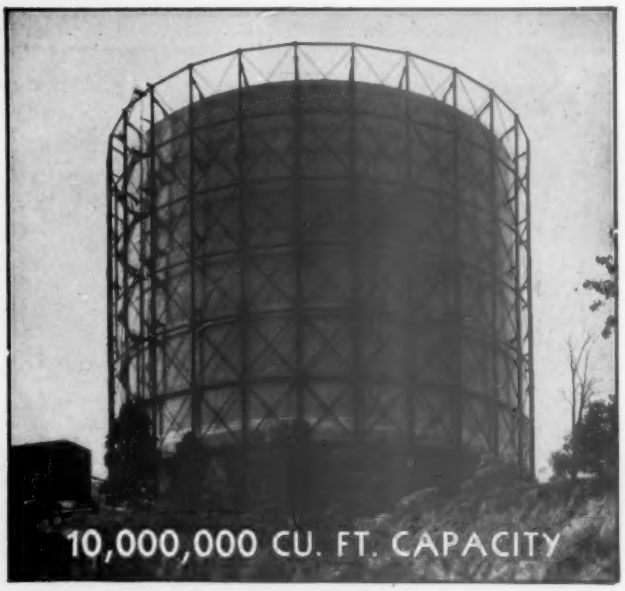

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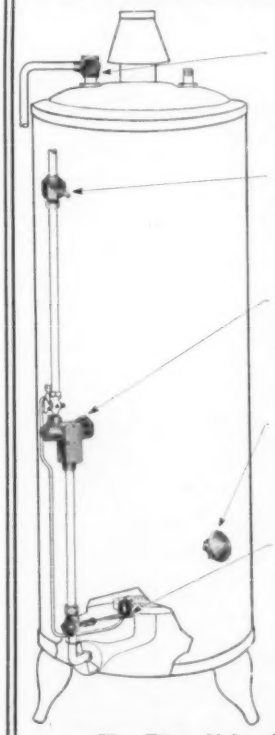

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The New Spirit in the Gas Industry

(Continued from page 21)

has been of great value to the gas industry—not only along various sales lines but covering research and technical aspects as well. During the past year in which I have been president of our own New England Gas Association, I have frequently observed the practical and helpful activities of its various units. The various gas associations have constituted a clearing house for the crystallization of thought and for the expression of leadership. Thus, these organizations have played a central part in the development of a new viewpoint and a new spirit in the gas industry. I believe that our approaching annual meeting program will still further indicate the clearing house and leadership functions which our Association plays here in New England.

The several periodicals serving the gas industry have also played an important and helpful part in holding aloft the torch of progress through a presentation of new developments. new ideas and the industry's adventures with problems and progress.

In conclusion, and this thought is the final and most important one which I would like to leave with you,—these developments which I have outlined indicate that there is a substantial and increasing public acceptance of gas and gas appliances and that they can be sold in increasing volume if the same intelligent planning and execution are granted to them that are granted to the products of other important industries.

Distinction Between Municipal Government and Ministerial Functions

(Continued from page 26)

nancial losses caused by negligence in an unsafe and a dangerous condition, the city is responsible. While a municipal corporation is not liable in ordinary cases where it licenses third persons, as contractors, to use its street, still it cannot by a license abdicate its powers or surrender its duty unless relieved by a state law. It is not, however, liable for the acts of its licensees unless it is negligent in respect to its *own* duty, and it is, therefore, usually necessary, in order to hold the municipality liable, to prove much more than negligence on the part of its licensee, as a contractor.

For these various established reasons of the law a city is liable for an injury or other financial loss resulting from negligence of a contractor, if the evidence indicates that the city officials negligently failed to supervise the contractor's work. Negligence on the part of city officials may be implied by the court if the character of the work being performed by the contractor is sufficiently dangerous to require supervision in order to reasonably protect property owners and pedestrians against injury. (See 294 Pac. 485.)

Economic Problems of the Small Gas Companies

(Continued from page 47)

Gas Makers' Run Sheet
Daily Operating Report
Weekly comparative Operating Report
Monthly Comparative Operating Report

As samples of these forms are appended to this paper further comment is unnecessary.

Unaccounted-For Gas Plantt Records

The amount of unaccounted-for gas that some of these small companies have to endure is surprising. Of nineteen of the companies which have been studied in connection with the preparation of this paper, it was found that for the year 1935 the following losses occurred as follows:

Six companies	5 to 7½%
Six companies	7½ to 10%
Four companies	10 to 12%
Three companies	19 to 25%

Elimination of some of the unaccounted-far gas will go a long way toward increasing the security of a company's financial position. Today there are tools with which to work that did not exist a few years ago and new means of stopping leaks are being developed from time to time. With the aid of the gas leak indicator to locate the leaks and with the aid of leak clamps and of certain materials that may be introduced into the mains for the purpose of stopping the leaks it seems to the writer that more progress should be made in reducing unaccounted-for gas than has been made within the last few years. If gas is not lost through leakage it must be lost through theft, and energetic efforts to locate and eliminate sources of thieving is just as important as the effort to locate and eliminate loss from main leakage.

In the attempt to be thoroughly frank in the exposition of this subject the writer may have conveyed to his audience that he is rather pessimistic regarding the future of the small gas companies. This is not quite so. He feels that there is a real problem to be solved and that if all interested in the welfare of the gas industry lend their best efforts to the solution of the problem, perhaps making sacrifices in some instances, a solution will ultimately be found. These small gas companies have gone on doing business for a good many years and somehow they will probably continue to go on in spite of threatening competition and many discouragements. Things are happening rapidly these days. The writer has the courage to feel that some new situation will develop which will go a long way toward solving many of the troubles which we have just been hearing about. This solution he feels will come through the result of a far more intimate relationship between the oil and gas industry than has existed heretofore. The two industries are so closely allied, as has been recently commented on in technical papers, that there is every reason for cooperation between the two industries. A gas much cheaper to manufacture than water gas is needed to the end that the way will be opened up to transmit reasonably cheap gas to these small, struggling manufacturers, and at the same time safely carry fixed charges on the transmission lines.

CONVENTION CALENDAR

February

10-12—Southern Gas Association, Southwest Regional Gas Sales Conference, Peabody Hotel,, Memphis, Tenn.
11-12—New England Gas Association, Hotel Statler, Boston, Mass.
18-20—American Gas Association, Mid-West Regional Gas Sales Conference, Palmer House, Chicago, Ill.

March

2- 3—American Gas Association, Industrial Gas Section, General Commercial and Hotel and Restaurant Sales Conference, Philadelphia, Pa.
4- 6—Penn. Gas Association, Skytop Lodge, Skytop, Pa.

April

21-23—Missouri Assn. of Public Utilities, Elms Hotel, Excelsior Springs, Mo.

May

10-14—Natural Gas Department, American Gas Association, Kansas City, Mo.

June

8- 9—American Gas Ass'n, Industrial Gas Section, Industrial Gas Sales Conference, Chicago, Ill.

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Pipe Corrosion and Coatings

(Continued from page 34)

of brass tubing soldered onto a tin handle. The capacity of the mold is 3½ cc., which when full of compacted damp soil and leveled off with a straight edge contains about 5 grams of earth, the specific gravity of soil is about 1.4. This method of approximation is fairly good for rapid work but is inaccurate and the soils should be weighed by a balance, for more exact work. The reagents were prepared by grinding the KCl, NaCl, CaO and Na_2CO_3 fine enough to pass 160-mesh sieve and adding 7.07 gm. Na_2CO_3 to 380 gm. KCl and 1.98 gm. CaO to 300 gm. NaCl and thoroughly mixing. The spoons used were then calibrated by leveling off the reagents with a straight edge and accurately weighing the spoonful. Fairly accurate results were obtained in this way. However, when using this method of titration each additional spoonful of reagent added increased the NaCl of KCl content to a point where supersaturation occurs in the supernatent liquid. A better method would be to use a standard solution of Na_2CO_3 and add it separately from the KCl. Each spoonful of reagent contained a certain number of grams of alkali which when added to 5 grams of soil was equivalent to a certain number of milliequivalents of acid per 100 grams of soil. The salts and spoons were as follows:

$KCl—Na_2CO_3$.
7.07 grams Na_2CO_3 in 380 g. KCl.
Porcelain spoon holds 1.15 g. of this mixture or .0212 grams Na_2CO_3. This is equivalent to 8 me. per 100 g. soil on 5 g. soil sample with large spoon.
Small spoon = 1.57 me. = .226 gr. of mixture.
NaCl—CaO mixture.
300 g. NaCl—1.98 gr. CaO.
Spoon holds .85 grams.

Usually two test tubes were prepared of each soil sample using different doses of the same reagent and the pH secured after 2-3 days. If the pH was below 7.8 the samples received extra doses and the pH redetermined. After securing a number of the pH readings corresponding to certain doses of alkali and provided that the last pH was near 7.8 or above, the number of me. of acid titrated (or alkali added) was obtained from a graph using pH versus me. acid, reading the corresponding me. of acid at pH of 8.0. In many instances the curve was projected or approximated especially on very acid soils. The reason for selection of the pH of 8.0 as the end point is shown by Denison in his examination of various soils, that titration curves of most soils rise rapidly after this point from a hitherto gradually increasing trend. Most of the knees in the curves for these soils occurred from 7.6-8.2. Very few such curves with marked knees were obtained in the soils examined here so pH 8.0 was arbitrarily taken since a comparison would be obtained."

(To be continued in March issue)

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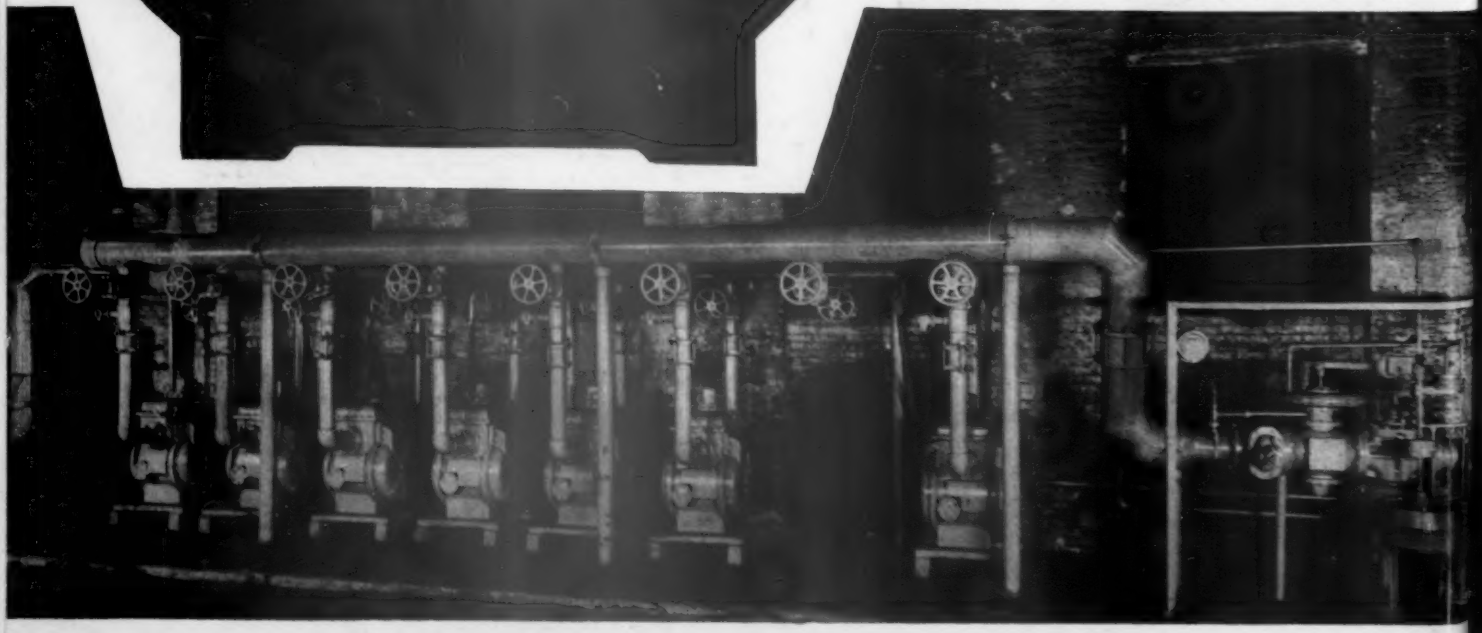
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